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STATE OF WIRELESS COMMUNICATIONS

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMUNICATIONS,
TECHNOLOGY, AND THE INTERNET

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

JUNE 4, 2013

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ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

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STATE OF WIRELESS COMMUNICATIONS

TUESDAY, JUNE 4, 2013

U.S. SENATE,
SUBCOMMITTEE ON COMMUNICATIONS, TECHNOLOGY, AND
THE INTERNET,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:32 p.m., in room SR-253, Russell Senate Office Building, Hon. Mark Pryor, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF HON. MARK PRYOR, U.S. SENATOR FROM ARIZONA

Senator PRYOR. I'll go ahead and call this to order.

I want to say welcome and good afternoon to everybody. I know we have a lot of people in attendance, and we understand that some people may be watching this on their mobile devices out in the hallway.

[Laughter.]

Senator PRYOR. But, nonetheless, we want to say thank you to all of our witnesses for being here. Thank you for your preparation.

This is the third in our, "state of" hearings in which we're trying to inform members about issues going on in the industry, but also hear from industry about what's going on, not just in the industry, but, really, around the world, and what all the trends are.

Wireless communication is the focus of today's hearing. We're going to hear from panelists who represent wireless providers and equipment manufacturers, as well as other panelists who analyze and monitor the industry and who advocate on behalf of wireless customers.

As we all know, wireless communications are used more and more. If you can say there is such a thing as the "traditional cell phone"—but, from traditional cell phone that many of us have relied on for the last several years, which was primarily voice communications, to now we see an increase in the use of Internet through wireless devices, and even things that we are beginning to just take for granted, these wireless devices, like garage door openers, TV remotes, Wi-Fi, Internet connectivity. These—the—licensed or unlicensed, this is becoming ubiquitous and ever present in today's world. In fact, with a smartphone or tablet, someone in this room could have a video chat with a family member, turn on or off their home entertainment system, and even purchase tickets to tonight's Washington Nationals baseball game.

I'm looking forward to hearing from our panelists. There are many new developments and new services that the industry is providing, and we are cognizant of that, and very appreciative of that, and appreciative of all the private investment that we see, and the many, many services that are being provided. And we, obviously, are concerned and we understand about the greatly increased need for the use of spectrum. We will all be interested to know the panelists' thoughts on the spectrum crunch and how it can be effectively addressed as both demand and technological innovations increase.

So, are the administration and Congress doing enough, and are they doing it in the right way? How can we ensure that spectrum, a public good, is being maximized for consumers and for businesses, and ultimately the taxpayers? The panelists before us today will provide their insights to these questions and many others.

I'm pleased to be joined today by Senator Wicker, my Ranking Member on the Subcommittee, and also we're going to have many, many of our Subcommittee Members come in and out today. This is a busy day on the Senate floor, so—

Senator Wicker.

**STATEMENT OF HON. ROGER F. WICKER,
U.S. SENATOR FROM MISSISSIPPI**

Senator WICKER. Thank you very much, Mr. Chairman. I am glad to join you on this, our third, hearing on the state of the industry.

Today, our focus is on the state of wireless communications in the United States. There is perhaps no platform for broadband delivery as dynamic and rapidly growing as mobile wireless communications. Consumers are turning to mobile technology in droves, making it their primary way of access to the Internet.

Last year, global mobile data traffic grew 70 percent. When it comes to voice services, American consumers are consistently cutting the cord and transitioning from traditional landline service to wireless as their primary means for voice communication. According to a recent CDC study—interestingly, Mr. Chairman—Mississippi and Arkansas are leading the way in wireless-only households, with 42.3 percent of adults in Mississippi and 44.4 percent of adults in Arkansas making a full conversion. That same study found that, by the second half of 2011, one in three households had only wireless phones. The rapid migration to wireless raises a number of critical issues for policymakers, many of which will be mentioned and discussed by the witnesses on our panel today.

As the Chair mentioned, one of the key issues for Congress to consider is how to maximize commercial access to spectrum in order to meet consumer demand for high-speed service and content-rich applications. One of the main avenues to achieve this goal is making the 1755–1780 megahertz band available for commercial services. This band was identified in the FCC's National Broadband Plan for its commercial potential. When paired with the AWS-3 band, this spectrum can be quickly used to expand existing systems, spur innovation, and drive economic growth.

I understand the wireless industry and Federal agencies have been working together to study this issue, and that the industry

has recently proposed a roadmap for clearing Federal systems out of the band. I urge DOD and other government entities currently using the band to continue to work together productively and in a quick, conclusive fashion to relocate operations and free up this spectrum for commercial and, ultimately, for consumer use.

This committee also needs to monitor, closely, the progress of the FCC's impending incentive auction of wireless broadcast spectrum. The success of this auction is critical to construction of the National Public Safety Broadband Network established in the Spectrum Act. It also would free up spectrum and raise much-needed revenue for deficit reduction. To achieve success, it is imperative that there be widespread all-inclusive participation in the auction. This is the best way to maximize revenues going forward, as Congress mandated.

I would like to thank our witnesses for testifying today. We look forward to hearing your views on the issues of spectrum availability, the incentive auction, and the overall state of wireless services in this country.

Thank you again, Senator Pryor, for holding this hearing, and I thank the members of our Committee, for their attendance and interest.

Senator PRYOR. Thank you.

Let me say that what we'll do is, we'll dispense with our opening statements, and everybody's opening statement will be made part of the record. But, we would like to move quickly to our panel.

We have a very distinguished panel today. I will recognize each one of them for a 5-minute opening.

We would really appreciate it if you could keep it to 5 so that the Subcommittee would have plenty of time to ask questions.

What I'll do, just to save time, is, I'll just go right down the list and then turn it over to Mr. Largent.

First, we're going to have the Honorable Steve Largent, President and CEO of CTIA, The Wireless Association. Second, we're going to have Mr. Steven Berry, President and CEO of Competitive Carriers Association. Third, we're going to have Mr. Doug Webster, Vice President, Service Provider Routing, Mobility and Video Marketing, Cisco Systems. Fourth, we will have Mr. Thomas F. Nagel, Senior Vice President, Business Development and Strategy, Communication and Data Services for Comcast Corporation. Next, we will have Mr. George Ford, Chief Economist of the Phoenix Center. And last, and certainly not least, we'll have Delara Derakhshani, Policy Counsel for Consumers Union.

So, again, welcome, all of you. And again, thank you, for the Subcommittee, for being here.

Mr. Largent, if you'd lead us off. Thank you.

**STATEMENT OF STEVE LARGENT, PRESIDENT AND CEO,
CTIA—THE WIRELESS ASSOCIATION®**

Mr. LARGENT. Mr. Chairman, Ranking Member Wicker, and members of the Subcommittee, thank you for this opportunity to testify on behalf of CTIA.

As we meet today, I've just returned from our annual spring show, and I really wish you could have joined us. You would have seen a great testament to the state of the wireless industry. It's a

vibrant, dynamic ecosystem that's innovative and competitive at every level. It's also an environment in which U.S. leadership is a consistent and defining characteristic.

Perhaps the best indicator of the wireless industry's vibrancy is its investment record. If you believe that businesses commit capital to markets that are open and competitive, then the \$30 billion that America's wireless carriers invested in 2012, alone, is a very good sign. This massive investment serves as a catalyst for what we, at CTIA, like to call "the virtuous cycle of wireless investment and innovation." Here's what I mean by that: To start, capital expenditures drive the creation of networks capable of supporting greater speeds and functionalities. Those new networks create a demand for new and more powerful devices, which then drive the development of new applications and content. That leads the—to more consumer usage, and, as that grows, so does the need for more spectrum.

This virtuous cycle is spinning at an incredible rate in the U.S. and is the reason why we are the world's leading wireless market. We have more than 50 percent of the world's 4G subscribers—let me repeat that—50 percent of the world's 4G subscribers, in spite of the fact that the U.S. is home to just 5 percent of the world's wireless subscribers. These subscribers use sophisticated phones and tablets that run on chips and operating systems developed by great American companies, like Qualcomm, Apple, Google, and Microsoft. And these networks and devices serve as the foundation for a U.S.-based applications industry that is creating jobs and transforming the way we consume information and engage in commerce.

Along with changing the way consumers communicate, advanced wireless networks are enabling whole new vertical markets to emerge. Mobile commerce and finance, intelligent transportation, smart grid, and mobile health services and applications, are all made possible by the existence of robust wireless broadband capabilities. And each of these opportunities helps to transform our economy in positive ways. So, as I hope I've demonstrated, there are a lot of great things emanating from the U.S. wireless communications industry. The benefits of those developments are felt throughout our society. However, success is hard to achieve, and can be still harder to maintain. As a result, there is a vital role for Congress and other government entities to enact smart policies that help the private sector to continue its hard work and innovation to advance U.S. leadership in this critical industry.

Without question, the area where policy leadership is most important is access to spectrum. Carriers must have access to additional licensed spectrum in order to keep up with Americans' demand for mobile broadband. Fortunately, Congress recognized this when it included provisions in last year's SPECTRUM Act, authorizing the FCC to conduct incentive auctions. Although the FCC is moving to implement that legislation, it is critical that the incentive auction process move forward expeditiously. But, even if the incentive auction process yields the full 120 megahertz called for in the National Broadband Plan, numerous projections on increased network traffic clearly indicate we're going to need more spectrum to keep up with the demand. In fact, much more.

To address that difference, Congress should, as it has in the past, look to repurpose bands held by Federal users for commercial use. It has worked well before, and it can work well again. One band that's especially important in enabling wireless companies to meet expanding demand is the 1755–1780 megahertz spectrum. While that band is currently used domestically by DOD and other Federal agencies, it is used internationally for commercial mobile services. Harmonizing the U.S. allocation with international use will produce significant economies of scale and scope, and, importantly, make it possible for consumers to use their wireless devices outside of North America. There is a broad industry support for pairing the 1755 band with the spectrum currently available for licensing at 2155–2180. Current law requires 2155 band to be licensed by February 2015, and it's our hope that the 1755 band can be made available so that the two bands can be auctioned together.

Pairing these bands will ultimately maximize their value to the industry, consumers, and also to the government, as the auction of the two bands, together, will deliver significantly more revenue to the Treasury than would an auction of just 2155 band.

CTIA looks forward to working with you to achieve this important objective. Thank you for your time today.

[The prepared statement of Mr. Largent follows:]

PREPARED STATEMENT OF STEVE LARGENT, PRESIDENT AND CEO,
CTIA—THE WIRELESS ASSOCIATION®

Chairman Pryor, Ranking Member Wicker, and members of the Subcommittee, thank you for this opportunity to testify on behalf of CTIA—The Wireless Association®.

As you begin today's hearing, I have just returned from CTIA 2013, our annual spring trade show, which draws thousands of attendees from around the nation and around the world. I wish you could have joined us. Had you been able to do so, you would have seen a great testament to the state of the wireless industry—a vibrant, dynamic ecosystem that is innovative and competitive at every level. It is also an environment in which U.S. leadership, and the competitive advantage that leadership confers upon our national economy, is a consistent and defining characteristic.

Perhaps the best indicator of the wireless industry's vibrancy and competitiveness is its capital investment record. If you believe, as I do, that businesses commit capital to markets that are open and competitive, and where they have a chance to earn a compelling return on what they invest, then the \$30 billion America's wireless carriers invested in their networks in 2012¹—a nine percent year-over-year increase from 2011—is a very good sign. This investment, which according to Bank of America Merrill Lynch equals a quarter of global wireless investment last year,² is all the more remarkable given the fact that the U.S. market includes just five percent of the world's wireless subscribers. It's a striking ratio: the U.S. comprises just five percent of the global wireless market but our investments outstrip that by five-fold.

And, while the numbers are impressive, last year was not an anomaly. The wireless industry has always been an active investor. Since 2001, wireless carriers in the U.S. have invested nearly \$300 billion in their networks, and this figure does not include more than \$35 billion in carrier expenditures on spectrum auctioned by the FCC.

This massive capital investment serves as a catalyst for what we at CTIA like to call "the virtuous cycle of wireless investment and innovation." Sustained capital expenditures facilitate the creation of networks capable of supporting greater speeds and functionalities, which, in turn, bring about new and more powerful and useful devices. The availability of new devices encourages the development of new applica-

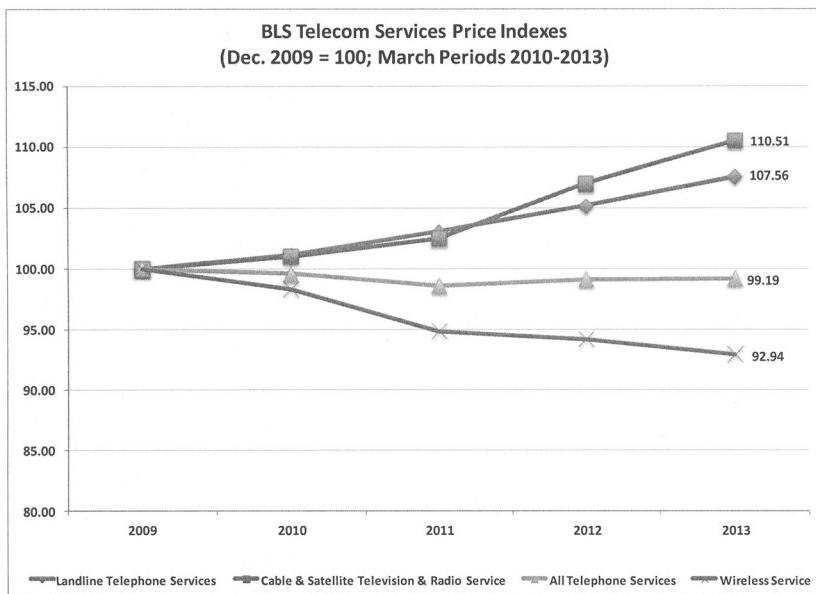
¹ <http://www.ctia.org/advocacy/research/index.cfm/AID/10316>.

² Didier Scemama, "Global Wireless CapEx: Increase 2013 Forecast by 7 percent," Bank of America Merrill Lynch, January 6, 2013.

tions and content, which help to drive consumer usage. And as usage grows, so too does the need for ever-more robust networks and more spectrum.

This “virtuous cycle” phenomenon is seen most vividly in the U.S. market, where the world’s most advanced Long-Term Evolution deployments have produced more than 50 percent of the world’s 4G subscribers.³ These subscribers use sophisticated devices that run on chips and operating systems developed by great American companies like Qualcomm, Apple, Google, and Microsoft. And these U.S.-derived networks and devices serve as the foundation for a fertile applications development industry—again, with its hub here in America—that is creating jobs and helping transform the way we consume information and engage in commerce.

America’s wireless subscribers are the beneficiaries of this virtuous cycle. Carriers’ fourth-generation network deployments and device vendors’ launch of advanced handsets and tablets in the U.S. market put American consumers at the vanguard of global wireless users, all in an environment where the Bureau of Labor Statistics Wireless Price Index has declined in each of the last five years, and by nearly 40 percent over the last 15 years.⁴ It is unquestionably the best story in the telecom sector.



Source: BLS Consumer Price Index Databases (not seasonally adjusted).

As functionality has expanded and price has declined, adoption and usage have simultaneously exploded. Wireless subscriber units—that is, active devices associated with subscriptions or prepaid accounts—totaled 326.4 million separate devices at year-end 2012. That’s equal to 102 percent of the total U.S. population, a greater and greater percentage of which is making their wireless phone their only phone. In Arkansas and Mississippi, for instance, more than 40 percent of the population is now “wireless-only.”⁵ By comparison, just eight percent of the population in those states is “wireline-only.”⁶

Similarly, many people are making their wireless device their on-ramp to the Internet. This is particularly true among Hispanics and African-Americans, where ownership of a home computer lags the total population and the mobile device is a critical tool for closing the “digital divide.” Data shows that Hispanics and African-

³ As of March 2013, the U.S. was estimated to have 52.5 percent of the world’s LTE subscribers, according to the Informa Telecoms & Media Group’s World Cellular Information System (WCIS) database.

⁴ BLS Consumer Price Index Databases (not seasonally adjusted).

⁵ Centers for Disease Control and Prevention, “Wireless Substitution: State-level Estimates From the National Health Interview Survey, 2010–2011,” National Health Statistics Reports No. 61, October 12, 2012.

⁶ *Ibid.*

Americans are significantly more likely to use their mobile devices to go online.⁷ Overall, 55 percent of wireless users (and 74 percent of those under age 50) now use their mobile devices to access the Internet,⁸ with aggregate data usage now exceeding 1.5 trillion megabytes.⁹

Beyond changing the way that consumers communicate, the prevalence and power of 4G wireless networks is enabling whole new vertical markets to emerge. Mobile payment, intelligent transportation, smart grid and mobile health services and applications are made possible by the existence of robust, ubiquitous wireless broadband capabilities. Each of these opportunities can help transform our economy in positive ways, helping to drive additional investment and job creation. The last of these verticals, mobile health, is particularly exciting, as innovative m-health technologies and applications have enormous potential to improve the efficiency of health care delivery in the U.S. and around the world through more personalized care for patients, by reducing health care costs, and by eliminating geographic and economic barriers to the delivery of health services.

So, as I hope I've demonstrated, there are a lot of great things emanating from the U.S. wireless communications industry and the benefits of those developments are felt throughout our society. However, as you know, success is hard to achieve and can be still harder to maintain.

As a result, there is a vital role for policymakers—chiefly Congress, but also including the FCC, NTIA and other government entities—to complement the great work being done in the private sector with smart government policies that create an environment in which the private sector can work hard, innovate and advance U.S. leadership in this critical, ever-expanding industry.

Without question, the most important area where continued policy leadership is necessary is access to spectrum. In order to keep pace with the demand Cisco will describe in its testimony, the wireless industry needs access to more spectrum.

Spectrum is the resource on which all of the benefits that spring from wireless communications are founded. While manufacturers have tenaciously devised and used advanced technologies to get the most out of existing spectrum allocations and though carriers have innovatively used unlicensed Wi-Fi spectrum to “offload” traffic from carrier networks, those efforts are simply not enough. Carriers must have access to additional licensed spectrum in order to keep up with technological requirements and exploding consumer demand for mobile broadband.

Fortunately, Congress recognized this when it included provisions in last year's Middle Class Tax Relief and Job Creation Act which authorized the FCC to conduct incentive auctions that may result in the conversion of some television broadcast spectrum for wireless broadband use. The FCC is moving to implement that legislation and it is vitally important that the incentive auction process move forward expeditiously. It is equally important that the Commission get it right. But even if the incentive auction process yields the 120 MHz called for in the National Broadband Plan, that and other bands identified for auction by last year's legislation will only represent a portion of what is needed for the industry to meet consumers' and businesses' need for wireless bandwidth.

To address the difference between what the incentive auctions yield and what is necessary to achieve the five-and ten-year spectrum targets set by the National Broadband Plan, Congress should, as it has in the past, look to repurpose bands held by Federal users for commercial use. It has worked well before and it can work well again. According to a 2011 GAO study, the Federal Government operates in approximately 70 percent of the spectrum below 3 GHz—18 percent on an exclusive basis and 52 percent on a shared basis with non-government users. Just as it is appropriate to ensure that spectrum available to the private sector is being used efficiently and for the most highly valued services, the Federal Government must evaluate the use of its own spectrum and free spectrum for commercial operations wherever possible. The far-reaching benefits to our national economy are too vital to do otherwise.

One frequency band currently occupied by Federal users that would be particularly helpful in allowing wireless companies to meet rapidly expanding demand is the 1755–1780 MHz spectrum. In the U.S., that band is currently used by the Department of Defense and other Federal agencies. However, the band is identified internationally for commercial mobile services and is used for that purpose through-

⁷ Pew Research Hispanic Center, “Closing the Digital Divide: Latinos and Technology Adoption,” March 7, 2013. Available at <http://www.pewhispanic.org/2013/03/07/closing-the-digital-divide-latinos-and-technology-adoption/>.

⁸ Pew Research Center, “Teens and Technology 2013,” March 13, 2013. Available at http://pewinternet.org/~/media/Files/Reports/2013/PIP_TeensandTechnology2013.pdf.
⁹ <http://www.ctia.org/advocacy/research/index.cfm/AID/10316>.

out most of the world. Reallocation of the band would harmonize U.S. allocation of spectrum with international use, produce economies of scale and scope, and, importantly, make possible consumer use of their wireless devices outside North America by alleviating compatibility problems. The 1755–1780 MHz band is also immediately adjacent to existing domestic wireless commercial spectrum and would therefore fit seamlessly into the current mobile broadband spectrum portfolio, allowing for more immediate equipment development and deployment as well as facilitating easy migration of existing and developing technologies to these bands.

There is broad industry support for pairing the 1755–1780 MHz band with spectrum currently available for licensing at 2155–2180 MHz. Current law requires the 2155–2180 MHz band to be licensed by February, 2015 and it is our hope that the 1755–1780 MHz band can be made available so that the two bands can be auctioned together. Pairing these bands will maximize their value not only to industry, but also to the government. A study by the Brattle Group found that auctioning the 2155–2180 MHz band by itself would yield \$3.6 billion, but when paired with the 1755–1780 MHz band, the pairing could generate \$12 billion.¹⁰ Given the budget realities facing Congress and the country, a difference of that magnitude should not be ignored.

To be clear, CTIA recognizes that there are legitimate Federal spectrum needs that must be protected, and we believe that last year's improvements to the Commercial Spectrum Enhancement Act provide an appropriate framework for Federal relocation. Handled appropriately, relocation of Federal users from prime bands below 3 GHz can facilitate movement to state-of-the-art technology. This will reduce ongoing maintenance and procurement costs for Federal agencies and free up scarce resources under current budget caps. Wireless carriers can then use the relinquished spectrum to provide services and grow the economy, resulting in a win-win-win outcome for Federal users, wireless carriers, and the American public. For these reasons, CTIA urges the Subcommittee to remain focused on spectrum policy.

Beyond a continued focus on bringing spectrum to market, two other areas where policy matters are regulation and taxation. With respect to the former, Congress established a deregulatory framework to govern wireless services twenty years ago and given the industry's record of investing, innovating, and competing, there is abundant evidence that charting that course was the right decision. Congress and the Commission should continue this long-standing commitment to "light touch" regulation and avoid imposing regulatory mandates that will raise costs and inhibit competitive differentiation among providers.

Another area where policy can have a significant impact is taxation, and though tax policy is not necessarily within the province of this Committee, it is so important that it merits mention in this discussion. Corporate tax reform, keeping Internet access free from taxation, and the idea that wireless service and digital goods should benefit from clear rules preventing discriminatory taxation are all issues this Congress may address, and getting these issues right is vitally important. We need to retire the regressive, inefficient system of telecommunications taxation designed for Ma Bell and replace it with a 21st century tax system that reflects the reality that communications connectivity is central to virtually every aspect of our economy.

Together, the right spectrum policies, regulatory restraint and sound tax policy can combine to support the investment and innovation that are pervasive in the wireless ecosystem, and which so demonstrably benefit the American public and economy. CTIA looks forward to working with you to achieve these objectives.

Thank you for your time today.

Senator PRYOR. Thank you.
Mr. Berry.

STATEMENT OF STEVEN K. BERRY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, COMPETITIVE CARRIERS ASSOCIATION

Mr. BERRY. Thank you, Mr. Chairman, Ranking Member Wicker, and members of the Subcommittee. Thank you for inviting me to testify today about the competition in the wireless industry.

I'm here today on behalf of the Competitive Carriers Association, representing over 100 wireless carriers and nearly 200 vendors and suppliers that support that competitive wireless ecosystem. My

¹⁰ http://www.brattle.com/_documents/UploadLibrary/Upload938.pdf.

membership believes and includes innovative competitors of all sizes, from Sprint to Bug Tussel Wireless, in Wisconsin, and every members' district in every members' state that's here today.

I'd like to talk about competition and what is needed to have a competitive wireless industry for years to come, and I may differ a little from my colleague sitting next to me. We are at a cross-roads. Policymakers have two choices. One path leads down a dangerous road of continued concentration, the other creates a new framework for competition. Without a competitive framework, increased regulation will be needed to artificially replicate the benefits of competition. And none of us want that. The virtuous cycle that Steve refers to may become the vicious cycle if the small carriers can't get access to spectrum and devices. AT&T and Verizon dominate a wireless industry that's already heavily concentrated, more so than the auto, oil, or banking industries. The two largest wireless carriers control 70 percent of all revenue in the wireless industry, compared to the two top automakers controlling 35 percent, oil controlling 25 percent, the top two largest banks, only 20 percent of the wireless—of the industry revenues. Policymakers should focus on a framework to create the next generation of competition.

At CCA's spring event, I, too, met with my members and a diverse membership at CCA, and one of the main themes of our expo was growth. And with the right framework, our competitive carriers believe we're prime for economic growth, job creation, expansion of mobile broadband throughout the Nation, and a competitive framework that supports continued light-touch regulatory regime.

There are three things the FCC can do today to help make this happen. First, the FCC should immediately restore interoperability into the lower 700 megahertz band. Interoperability has been fundamental to the wireless industry since its inception, and has supported the devices and roaming relationships. That all changed after auction 73, when AT&T was allowed to carve out a unique band plan in the lower 700.

Mr. Chairman, in 2008, following the auction, you said, "History will show that the way the FCC structured the auction basically helped the two big wireless companies, to the detriment of competition in this country." History has proven your concerns to be accurate, Mr. Chairman. Yet, history need not repeat itself.

The lower 700 megahertz band, unlike Humpty Dumpty, can be put back together again. It requires immediate action from the FCC. And the record is now complete, and the FCC must immediately act to restore interoperability, which will allow competitive carriers to utilize over \$2 billion invested in beachfront spectrum. This will allow access to devices, data roaming, expandable broadband, especially in rural America, and spark new competition in the industry.

Second, but maybe more important in the long run, competitive carriers must have access to spectrum. The FCC must revise its broken decade-old spectrum screen and apply those new rules to the upcoming incentive auction, using the authority the Congress just reaffirmed. Congress got it right, set the right tone; now it's up to the FCC to implement a competitive auction. Spectrum must be made available in small geographic areas so that the greatest

number of carriers can participate, sized for bidding by all carriers. This means that it should be in CMAs, cellular market areas, in blocks of spectrum. This would maximize revenue to the Treasury, and the U.S. taxpayer will thank you.

Let me be clear. All carriers, including Verizon and AT&T, should be allowed to participate in the auction. However, limiting how much spectrum any one carrier can obtain in a particular market just makes sense. No one or two carriers should be able to walk away with the entire pie. Some have claimed that DOJ's analysis tries to rig the auction. I don't read it that way, and nor does Attorney General Dick Thornburgh, who served under five Presidents. He recently wrote the DOJ and the FCC, and suggested that that policy is consistent with the competition policy under Republican and Democratic administrations, alike.

I'd like to have his letter included in the record, if that's OK, Mr. Chairman.

Senator PRYOR. Without objection.

[The information referred to follows:]



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June 3, 2013

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Acting Chairwoman Mignon Clyburn
Commissioner Jessica Rosenworcel
Commissioner Ajit Pai
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Ex Parte Presentation
WT Docket No. 12-269
Policies Regarding Mobile Spectrum Holdings

Dear Acting Chairwoman Clyburn and Commissioners Rosenworcel and Pai:

On behalf of Sprint Nextel Corporation ("Sprint"), I hereby submit this letter in support of the recently filed *ex parte* submission of the United States Department of Justice (the "Department") in the above-referenced proceeding.¹

I have had the privilege of serving in the Department under five presidents, including as U.S. Attorney General in the cabinets of Presidents Reagan and George H.W. Bush, as Assistant Attorney General in charge of the Criminal Division, and as U.S. Attorney for the Western District of Pennsylvania. After reviewing the Department's *Ex Parte* in this proceeding, I believe it is fully consistent with its longstanding approach to competition policy under Republican and Democratic administrations alike. As a life-long Republican, I am proud that President Theodore Roosevelt was the first to promote and vigorously enforce our nation's antitrust laws.² President Roosevelt recognized the pro-business importance of breaking the grip of monopolists that were stifling competition and innovation to the detriment of the U.S. economy and consumers. I am also proud both of the antitrust enforcement record of the administrations I served and of their having pursued their enforcement efforts with a focus on the twin goals of using sound economic theory to promote consumer welfare and increasing regulatory predictability.³

¹ See *Ex Parte* Submission of the United States Department of Justice, WT Docket No. 12-269 (filed April 11, 2013) ("Department's *Ex Parte*"); see also Letter from Wayne Watts, Sr. Executive Vice President and General Counsel, AT&T Inc., to Chairman Genachowski, et al., WT Docket No. 12-269 (filed April 24, 2013) ("AT&T Letter"); Letter from Fred Upton, Chairman, Committee on Energy & Commerce, U.S. House of Representatives, et al., to Julius Genachowski, Chairman, FCC, WT Docket No. 12-269, at 3 (filed April 19, 2013).

² See, e.g., *Northern Securities Co. v. U.S.*, 193 U.S. 197 (1904).

³ See generally Broder, *U.S. Antitrust Law and Enforcement*, Ch. 1[D] (Oxford University Press, 2d ed. 2012). For example, in 1982 the Department issued the first substantial revision to its Merger Guidelines since the original Guidelines were released in 1968, providing companies planning major transactions with insight into the process used by the agencies to decide whether to challenge the proposed transaction as anticompetitive. See Eleanor M. Fox, *Introduction: The 1982 Merger Guidelines: When Economists Are Kings?*, 71 Cal. L. Rev. 281, 296 (1983) (describing the growing "consensus that antitrust should not be used in ways that interfere with efficiency" and that "economics should be used to inform antitrust"); Janusz A. Ordover & Robert D. Willig, *The*

The Department's *Ex Parte* recognizes the importance of these goals and properly draws upon decades of its antitrust policies and precedents in offering its comments.⁴ For the last 40 years, the Department has consistently supported public policies that promote competition and innovation in the telecommunications industry—from the breakup of the Bell System in 1984 during the Reagan administration, to the allocation of new broadband PCS spectrum as competition to the old analog cellular duopoly during the George H.W. Bush administration, to challenges to proposed telecommunications mergers under the George W. Bush administration, to the Department's exercise of its case-by-case merger review authority.⁵

In the wireless telecom context, the Department has necessarily worked closely with the Commission due to the spectrum management implications of such matters.⁶ In this proceeding, the Department simply continues this well-established practice by commenting on how prospective rules of general applicability for both spectrum auctions and secondary market transactions could protect and enhance the competitive dynamic of the wireless sector to the benefit of the American economy, consumers, and businesses.

Unfortunately, it appears that the Department's *Ex Parte* has been misconstrued by others as seeking to "rig" a specific auction (the upcoming 600 MHz Broadcast Incentive Auction) for the benefit of specific parties and to the detriment of other specific parties. I do not read the Department's *Ex Parte* to do any such thing. Rather, consistent with its longstanding approach, it encourages the Commission to adopt reasonable spectrum aggregation limits to protect competition and promote innovation in the wireless sector.

Moreover, as someone who has spent much of his career in law enforcement and as a two-term governor of Pennsylvania, I strongly support deployment of the FirstNet public safety broadband network that will be funded by spectrum auctions. I would not be speaking in favor of the Department's *Ex Parte* if I believed reasonable spectrum aggregation limits posed a substantial risk of depressing auction proceeds and thereby undermining FirstNet.⁷

⁴ 1982 *Department of Justice Merger Guidelines: An Economic Assessment*, 71 Cal. L. Rev. 535, 535, 574 (1982) (Merger Guidelines designed to "close the gap" between enforcement of the merger statutes and "the new learning in industrial economics" in a way that "protects competition and promotes social welfare").

⁵ Department *Ex Parte* at 2.

⁶ Department *Ex Parte* at 2-3; see *United States v. GTE Corp.*, 603 F. Supp. 730 (D.D.C. 1984) (noting that as conditions of GTE Corp.'s proposed acquisition of Southern Pacific Communications Company, the Department required GTE to (i) separate its local monopoly operations from its long distance and other competitive operations, (ii) provide equal access to all competitors on a phased-in basis, (iii) not provide interexchange services, (iv) phase out its existing interexchange services, and (v) agree to other competitive restrictions); *U.S. v. SBC Commc'ns, Inc.*, 489 F. Supp. 2d 1 (D.D.C. 2007) (describing Department challenges to two similar telecommunications mergers to prevent excess concentration of "last mile" connection holdings); *U.S. v. AT&T Inc. and Dobson Commc'ns Corp.*, 541 F. Supp. 2d 2 (D.D.C. 2008) (describing Department challenges to AT&T's acquisition of competitor to prevent AT&T from controlling all or most of the low frequency band cellular spectrum licenses in several rural local markets).

⁷ It should be noted that the notion of using competitive bidding as the preferred method of licensing spectrum was first published at the Commission during the Reagan Administration. See Evan Kwerel & Alex D. Felker, *Using Auctions to Select FCC Licensees*, Office of Plans and Policy, Working Paper Series 16, Federal Communications Commission (May 1985).

⁷ In addition to my past service in the Department, I am currently a member of the FBI Director's Advisory Board.

One frequent refrain I heard from the businesses community when I was governor of Pennsylvania was the need for regulatory predictability. The Antitrust Division's transaction-specific merger review does not always provide perfect guidance for every prospective transaction. With this in mind, I can understand why the Department would support the prospective certainty that reasonable FCC spectrum aggregation limits would provide. With such a rule, carriers would gain the benefit of knowing *in advance* how much spectrum they could obtain and how much their rivals could purchase in an auction or secondary market transactions. In particular, such certainty would help prospective auction participants prepare their business plans, models and strategies, and obtain necessary financing, leading to a more effective and efficient auction. Spectrum aggregation caps were in place before the Commission launched its Broadband PCS auctions in the 1990s. Those auctions were famously successful, raising billions in revenue and creating numerous new wireless competitors.

Lastly, some argue that the Department's *Ex Parte* conflicts with the spectrum-related provisions of the Middle Class Tax Relief and Job Creation Act of 2012 because, they assert, it would exclude qualified bidders and thereby put the Commission in the position of picking winners and losers.⁸ Here again, I do not read the Department's *Ex Parte* as supporting such an approach. As I understand the contemplated limits, it would not make a bidder ineligible to participate in an auction. Rather, it would provide prospective guidance on how much spectrum a bidder could acquire in an auction based either on its current spectrum holdings or an auction-specific cap. This approach is far more efficient than spectrum divestitures post-auction or as conditions to secondary market transactions. Indeed, Congress recognized the utility of spectrum aggregation limits when it preserved the Commission's jurisdiction to adopt them in the Spectrum Act.⁹ In this rulemaking proceeding, therefore, the Commission is doing exactly what the Spectrum Act reaffirmed—exercising its jurisdiction to consider the adoption of reasonable spectrum aggregation limits.

For the foregoing reasons, I support the Department's *Ex Parte* as consistent with longstanding Department policy and precedent and the Commission's efforts to adopt appropriate rules to promote competition and innovation in the wireless telecommunications sector.

Respectfully submitted,



Dick Thornburgh

⁸ Pub. L. No. 112-96, 126 Stat. 156 (2012) (the "Spectrum Act").

⁹ Reply Comments of Sprint Nextel Corporation at 2-3, WT Docket No. 12-269 (January 7, 2013).

Mr. BERRY. And speaking about spectrum, incentive auctions should not be the only source of additional spectrum. Carriers need a functioning secondary market, and Federal holdings must be reviewed and, where possible, reallocated for commercial use. I totally agree with Mr. Largent that the 1755–1780 and 2155–2180 needs to be paired and sold, and we ought to do it today.

Finally, access to the networks is critical. As the transition to all IP networks move forward, the bedrock technology-neutral interconnection principles directed by Congress in the 1996 Act must be reaffirmed.

Mr. Chairman, CCA and our members stand ready to help you and the Committee restore competition, spur investment and innovation, create jobs, and expand mobile broadband in rural America.

Thank you.

[The prepared statement of Mr. Berry follows:]

PREPARED STATEMENT OF STEVEN K. BERRY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, COMPETITIVE CARRIERS ASSOCIATION

“COMPETITION AT THE CROSSROADS: PREVENTING DUOPOLY IN TODAY’S WIRELESS MARKETPLACE”

Chairman Pryor, Ranking Member Wicker, and members of the Subcommittee, thank you for inviting me to testify about the state of competition in the wireless industry. I am here today on behalf of the Competitive Carriers Association, the nation’s leading association of competitive wireless carriers, with over 100 carrier members ranging from small, rural providers serving fewer than 5,000 customers to regional and national providers serving millions of customers. We also represent almost 200 Associate Members—small business vendors and suppliers that serve carriers of all sizes and employ your constituents. The entire mobile ecosystem serving competitive carriers is dependent on vibrant competition in the wireless industry at all levels. CCA’s diverse membership is bound together by a shared goal for competitive policies and a shared concern over the growing market power of the “Twin Bells”—AT&T and Verizon. Through a steady stream of acquisitions, these two dominant carriers have turned what once was a robustly competitive wireless marketplace into an industry marching towards duopoly. I know that several members of this Subcommittee, as well as the Federal Communications Commission and the Department of Justice, have voiced the same concerns.

In my testimony today, I will provide a snapshot of today’s wireless industry, elaborate on the challenges facing competitive carriers, and offer proposals for restoring wireless competition going forward. Indeed, policymakers have two distinct and different paths for the future of the wireless industry—allow continued market dominance by two carriers and cement a duopoly in the industry, which will ultimately result in a heavy regulatory regime to attempt to replicate the benefits of competition, or establish a new competitive agenda for the next generation which will fuel economic investment, job creation, innovation, and increased consumer access to all the benefits of mobile broadband. Our members are prepared to invest, innovate, and create jobs, but need access to critical inputs to expand and grow their businesses.

To fully appreciate where we stand as an industry, it is important to take stock of how we got here. The wireless industry in the United States actually began as a duopoly in 1981, when the Federal Communications Commission (“FCC”) divided a total of 50 MHz of cellular spectrum in each local area between just two providers, one of which was the incumbent wireline telephone company. Even with this duopoly, policies required the incumbent to support connectivity—interoperability and roaming—to prevent a monopoly. Congress broke-up this original duopoly in 1994, when it provided the FCC with auction authority that led to making available 120 MHz of PCS spectrum. That auction, along with later auctions in other spectrum bands, gave rise to a host of new wireless carriers and sparked increased competition. For many years, until the late 2000s, the wireless industry was a shining example of robust competition, with numerous carriers at the national and regional level competing to deliver steadily improving services at declining prices. In the FCC’s first 13 reports on the state of competition in the wireless industry released between 1995 and 2009, the agency was able to conclude that the industry was

characterized by either growing competition or “effective competition.” Policymakers hailed the wireless industry at the time as “one of the great success stories” resulting from Congress’s and the FCC’s efforts to establish and maintain a regulatory framework in which competition could thrive.¹

Today, however, the gains in wireless competition over the past two decades are in danger, as the Twin Bells threaten to drag the industry back towards a duopoly. The Twin Bells have gobbled up numerous competitive carriers in recent years, including ALLTEL, Dobson, Centennial, Rural Cellular Corporation, and a long list of others. And as AT&T and Verizon have grown, so too has the level of industry consolidation. According to the FCC’s latest competition report, the wireless industry’s Herfindhal-Hirschman Index (HHI) value—a common measure of consolidation—had grown to 2,873 by the end of 2011.² To put that in perspective, that figure is 373 points higher than the level considered “highly concentrated,” and 722 points higher than the level measured in 2003, the first year the FCC calculated HHIs. The report also found that the Twin Bells together account for an astounding 67 percent of industry revenue.³ That combined share is far higher than the combined shares for the top two firms in other “consolidated” industries. By comparison, the top two firms in the auto industry hold a 35 percent share of total revenue; the top two firms in the oil industry hold a 24 percent share; and the top two firms in the banking industry hold a 20 percent share.⁴ Not surprisingly in light of these figures, the FCC has been unable to find “effective competition” in the wireless industry in any of its last three annual competition reports.

The Twin Bells are not content merely holding a dominant position in the wireless marketplace; they have also abused their dominance by blocking competitors’ access to key inputs that are necessary for a competitive market to exist. For instance, AT&T and Verizon each continue to aggregate massive amounts of wireless spectrum—which the FCC calls “the lifeblood of the wireless industry”—by using their vast resources to purchase large swaths of spectrum. Since the start of 2012, these two carriers have filed to gain access to almost 800 licenses in bands used to offer mobile services, including nearly 300 licenses in bands below 1 GHz. Some of the most significant wireless deals in recent memory have been spectrum-only transactions, such as Verizon’s 2012 acquisition of AWS-1 licenses from the four largest cable companies, AT&T’s 2012 acquisition of NextWave Wireless and its substantial WCS and AWS spectrum holdings, and AT&T’s 2011 acquisition of Qualcomm’s nationwide licenses in the Lower 700 MHz band. The Twin Bells’ spectrum holdings below 1 GHz—“beachfront” spectrum in bands ideally suited for new entrants and smaller carriers seeking to expand their coverage—are particularly extensive. The FCC estimates that Verizon holds 45 percent of the spectrum in the two major bands below 1 GHz, while AT&T holds 39 percent of the spectrum in those bands.⁵ The more of this spectrum the Twin Bells stockpile for themselves, the less is available to competitive carriers. And as they continue to tighten their stranglehold on spectrum and other key inputs—like access to networks for roaming and interconnection, and access to cutting-edge, interoperable devices—the wireless industry today looks more and more like the duopoly of a generation ago.

The industry thus stands at a crossroads, with two possible paths forward. One option would be to do nothing, and allow AT&T and Verizon to continue swallowing their competitors, aggregating spectrum, and thwarting access to other critical inputs. Eventually, the Twin Bells’ control over the marketplace would become so absolute, and competition would be so severely damaged, that a return to heavy-handed, utility-style regulation might be necessary to ensure reasonable prices and quality service. Most policymakers would not welcome this outcome, nor would CCA and its members. But the increasing dominance of a duopoly will compel a regulatory response if competition is not available to discipline prices, ensure responsive service, and deliver other benefits to consumers.

The other path—and in CCA’s view, the far better option—would be to promote increased competition by preventing further consolidation by the Twin Bells and adopting rules to encourage a competitive framework and preserve access to key inputs. CCA has advanced concrete proposals for such reforms before the FCC and

¹ See CTIA, Interview with Kevin Martin, at 6, *Wireless Wave* (Fall 2005), available at <http://www.ctia.org/advocacy/index.cfm/AID/10522>.

² Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 11-186, Sixteenth Report, FCC 13-34, ¶2 (rel. Mar. 21, 2013) (“16th Mobile Wireless Competition Report”).

³ *Id.* ¶52.

⁴ See Free Press, *Why the AT&T-T-Mobile Deal Is Bad for America*, Mar. 22, 2011, at 1, available at <http://www.freepress.net/sites/default/files/fp-legacy/ATT-TMobile.pdf>.

⁵ 16th Mobile Wireless Competition Report ¶129.

Congress. In particular, and as I will discuss in greater detail, the FCC should adopt rules to safeguard competitive carriers' access to spectrum—both by updating the “spectrum screen” used to evaluate wireless acquisitions, and by structuring spectrum auctions in a way that encourages and rewards participation by a range of competitive carriers. The FCC should also ensure that its rules preserve competitive carriers' access to networks, by enforcing roaming requirements and by reaffirming interconnection obligations. And the FCC should facilitate access to devices by restoring interoperability and by working with the Copyright Office to reinstate consumers' ability to unlock their handsets. Such measures, if adopted and implemented promptly, may well be what the industry needs to avert a true duopoly and to restore competition in this once vibrant marketplace.

Access to Spectrum

The FCC should start by ensuring that spectrum is allocated efficiently, and in a way that enables wireless competition to flourish. The FCC has made clear time and again that access to spectrum is a “precondition to the provision of mobile wireless services” and is “critical for promoting the competition that drives innovation and investment.”⁶ The Department of Justice (“DOJ”) echoed this sentiment in a recent submission to the FCC, where it stated that soaring demand for mobile broadband in recent years has “made spectrum a critically scarce resource” for wireless carriers.⁷ Both agencies also have recognized that access to low-frequency spectrum—which can provide “the same geographic coverage, at a lower cost, than higher-frequency bands”⁸—is especially important for new entrants and smaller carriers. In this vein, DOJ has urged the FCC to adopt rules ensuring that competitive carriers have the opportunity to acquire spectrum, particularly in low-frequency bands—a measure DOJ says would “improve the competitive dynamic” in the industry and “benefit consumers.”⁹ CCA agrees entirely with the DOJ’s assessment, and has proposed a slate of reforms to advance the procompetitive goals that I know both agencies share.

In particular, CCA has urged the FCC to overhaul its “spectrum screen”—the tool the agency uses to identify spectrum acquisitions, in the secondary market or at auction, which may give an entity control over too much spectrum in a given area. For years, the screen has played a key role in the FCC’s efforts to evaluate the effects of proposed transactions and auction design choices. But the screen, first adopted in 2003, is a poor fit for today’s marketplace. Among other things, the current screen fails to account for important differences between high and low frequency spectrum bands. And the screen largely ignores competitive effects at the national level, despite the FCC’s recognition that those effects are vital in today’s marketplace. The FCC must complete the Mobile Spectrum Holdings Rulemaking, currently in process, before the upcoming broadcast incentive auction rules can be established.

In light of these deficiencies, CCA has proposed targeted reforms—the FCC needs to adopt two additional screens. First, the FCC should adopt a separate screen for low-frequency spectrum as a supplement to the existing screen, which looks to all forms of spectrum held by an entity in a local area. Second, the FCC should apply a nationwide screen in addition to its analysis of local holdings. There should be a clear and predictable mechanism for adding or removing spectrum from the analysis. And finally, the FCC should apply a heightened level of scrutiny for transactions exceeding any applicable screen threshold. Such reforms not only would strengthen the screen as a tool for evaluating spectrum transactions, but also would provide the necessary certainty to entities contemplating spectrum acquisitions. The FCC should adopt these reforms as soon as possible—by the end of 2013 at the latest, and in all events before the new incentive auction for repurposed broadcast spectrum is underway.

The upcoming incentive auction offers one of the few near-term opportunities to allocate low-frequency spectrum for mobile broadband, and so presents an excellent opportunity to stoke the embers of wireless competition. As Chairman Pryor noted about the 700 MHz auction in 2008, “[h]istory will show that the way the FCC structured the auction basically helped the two big wireless companies to the det-

⁶ *Policies Regarding Mobile Spectrum Holdings*, Notice of Proposed Rulemaking, 27 FCC Rd 11710 ¶4 (2012).

⁷ Ex Parte Submission of the U.S. Dep’t of Justice, WT Docket No. 12-269, at 9 (filed Apr. 11, 2013) (“DOJ Ex Parte Submission”).

⁸ 16th Mobile Wireless Competition Report ¶122.

⁹ DOJ Ex Parte Submission at 1.

riment of competition in this country.”¹⁰ With the upcoming incentive auctions, the FCC has the authority, as recently reaffirmed by Congress, to “adopt and enforce rules of general applicability, including rules concerning spectrum aggregation that promote competition.”

CCA thus has urged the FCC to design its rules for the upcoming incentive auction in a manner that gives carriers of all sizes a meaningful opportunity to acquire spectrum where needed. The FCC must adopt a spectrum auction process which ensures that all carriers have a meaningful opportunity to participate. All carriers, including smaller carriers, must have an opportunity to bid, win, and integrate needed spectrum into their existing network. In particular, consistent with last year’s Spectrum Act, the FCC should adopt eligibility rules for the auction that would prevent excessive spectrum aggregation by the Twin Bells. CCA also supports the use of bidding credits and related mechanisms that would promote participation by rural, mid-size, and regional carriers. The FCC must make spectrum available in small geographic areas, such as Cellular Market Area (CMAs), that can be used by competitive carriers, and must not include blind and package or combinatorial bidding practices that may prevent smaller carriers from accessing spectrum even if licensed in small geographic sizes. These measures will be vital to the success of the auction, and by extension to the advancement of competition in the wireless industry. This will also increase potential revenue from the auction by encouraging participation from the maximum number of bidders, while also providing carriers with much needed spectrum to compete in a data hungry market.

Additionally, policymakers should consider new ways of encouraging full spectrum usage in rural areas. For example, the Rural Spectrum Accessibility Act introduced last Congress by Senators Snowe and Klobuchar would encourage carriers to partition or disaggregate spectrum not currently being used in areas to make it available for use by competitive carriers wishing to serve those rural markets. While additional spectrum is needed to allow the industry to keep up with consumers’ demands, it is important for policymakers to consider all opportunities to make full utilization of spectrum currently allocated for mobile broadband.

A close look at current spectrum utilization is not complete without careful consideration of the Federal government’s use of spectrum. I commend the work of those on this Committee, in Congress, and at the FCC and NTIA who continue to ensure efficient spectrum use by Federal users. Congress should ensure the appropriate incentives are in place to encourage efficient Federal use and to encourage reallocation of spectrum for mobile broadband use where necessary. Doing so allows taxpayers the maximum usage and return for a finite, taxpayer-owned resource. In particular, I praise the FCC’s work to clear the 1695 MHz—1710 MHz band and the 1755 MHz—1780 MHz band to auction paired with the 2155 MHz—2180 MHz band. This allocation would yield readily usable spectrum already in an LTE ecosystem and internationally harmonized, encouraging investment in mobile broadband networks and maximizing the revenue of the required auction of the 2155 MHz—2180 MHz band.

Access to Networks

Competitive carriers also need access to other providers’ networks to offer a nationwide, interconnected service to consumers. The FCC should make it clear that the technology neutral interconnection requirements of the 1996 Telecommunications Act to provide wholesale connectivity to other facilities-based carriers remains intact. Most competitive carriers lack a national footprint, so their customers must roam on other compatible networks to receive service when outside their provider’s service area. Moreover, in order to complete calls to the customers of other providers, carriers must be able to interconnect with those other providers’ networks. AT&T and Verizon control (or are affiliated with) ubiquitous wireless and wireline networks, and naturally play a dominant role in the market for voice and data roaming, as well as in the provision of interconnection. Preserving access to these key network-related inputs is critical to competition, as it enables competitive carriers to provide a service of similar scale and functionality to the service offered by AT&T and Verizon, regardless of the type of technology used to transmit traffic.

On the roaming front, CCA and its members were pleased by the FCC’s adoption of rules requiring wireless carriers to offer data roaming on fair and reasonable terms, and by the D.C. Circuit’s decision to uphold those rules against a challenge by Verizon. But as the FCC’s latest competition report acknowledges, “the ability to negotiate data roaming agreements on non-discriminatory terms and at reason-

¹⁰John Eggerton, *Pryor: FCC ‘Fouled Up’ Spectrum Auction*, Broadcasting & Cable, Feb. 26, 2008, available at [http://www.broadcastingcable.com/article/112604-Pryor_FCC_Fouled_U](http://www.broadcastingcable.com/article/112604-Pryor_FCC_Fouled_Up_Spectrum_Auction.php)

able rates remains a concern.”¹¹ Our members have found it particularly difficult to negotiate for roaming when they cannot discern whether the terms and conditions offered by the Twin Bells are in line with those offered to other carriers. The FCC must continue to address whether roaming agreements offered in the market are fair and economically sustainable and continue efforts to encourage access to roaming for competitive carriers and consumers who expect their call to always go through.

The FCC also should protect the ability of competitive carriers to interconnect with the wireline networks of the large landline incumbents. As the FCC said in its National Broadband Plan, “[b]asic interconnection regulations. . .have been a central tenet of telecommunications regulatory policy for over a century,” and “[f]or competition to thrive, the principle of interconnection. . .needs to be maintained.”¹² AT&T, however, apparently does not share this view. Its wireline affiliate recently asked the FCC to waive statutory interconnection obligations in areas where the carrier upgrades to Internet Protocol (or “IP”) technology. But there is no basis to abandon these bedrock competitive protections just because of a change in technology. Quite the contrary—the interconnection mandates in Section 251 are technology-neutral, as the FCC has repeatedly stated. The FCC should reaffirm this broadly supported principle as the industry transitions to IP, and enable competitive carriers to interconnect with these next-generation telecommunications networks.

Access to Devices

Another critical input for competitive carriers is access to the handsets and other devices. The FCC has recognized that “[h]andsets and devices are a central part of consumers’ mobile wireless experience, and a key way by which providers differentiate their offerings.”¹³ For years, the largest carriers used exclusivity agreements with major device manufacturers to gain an edge over competitive carriers. AT&T was particularly successful at securing exclusive rights over popular handsets, most notably the iPhone. Only after DOJ opened an investigation into handset exclusivity agreements—with the AT&T/iPhone arrangement reportedly “at the center” of the inquiry¹⁴—did Verizon begrudgingly allow other carriers to offer these formerly exclusive handsets. So, more recently, the Twin Bells have pursued other strategies to frustrate competitive carriers’ access to devices.

For example, AT&T has prevented the development of interoperable devices in the Lower 700 MHz band—that is, devices that operate in the B Block and C Block held by AT&T, as well as in the Lower A Block held by CCA’s members. Post auction, private band plans were created that were not contemplated or included in the band plan presented to the FCC leading up to the auction. Device interoperability is a prerequisite to a well-functioning wireless marketplace; it encourages innovation, gives consumers more choices, and reduces costs to end users. Interoperability also makes roaming technologically possible; non-interoperable devices simply cannot roam on other carriers’ networks. But AT&T’s efforts to bifurcate the Lower 700 MHz band—and to force manufacturers to develop devices that operate only on its portion of the band—have stymied device interoperability. Without a device ecosystem for the Lower A Block, 12 MHz of broadband-capable spectrum has been orphaned, the nearly \$2 billion dollar investment made by CCA’s members in that spectrum is in many respects stranded, and competitive carriers must wait on the sidelines while the two largest carriers enjoy a head start on deploying 4G LTE on 700 MHz spectrum throughout the country. CCA has urged the FCC to address these issues by restoring interoperability in the Lower 700 MHz band—just as has been the practice in every other spectrum band designated for wireless telecommunications services since the early 1980s. Thorough economic analysis demonstrates the low costs and great rewards of interoperability, and real world technical tests have shown no impact on customer experience by moving to an interoperable Lower 700 MHz band. The FCC must take action on this matter in the near future to avoid further damage to wireless competition.

Not only will a clear pathway to 4G using 700 MHz spectrum expand mobile services, it will also provide critical partnership opportunities for the forthcoming First Responder Network Authority (FirstNet) public safety broadband network. The same rural and regional carriers that have struggled to gain access to the interoperable devices needed to deploy 4G LTE mobile broadband networks are the carriers

¹¹ 16th Wireless Competition Report ¶210.

¹² *Connecting America: The National Broadband Plan*, at 49 (2010), available at <http://download.broadband.gov/plan/national-broadband-plan.pdf>.

¹³ 16th Wireless Competition Report ¶2.

¹⁴ See Andrew Ross Sorkin, *Justice Department Said to Weigh Telecom Inquiry*, N.Y. TIMES, Jul. 7, 2009, available at <http://dealbook.nytimes.com/2009/07/07/justice-department-eyeing-telecom-probe-report-says/>.

that currently provide service in rural and remote areas. Restoring interoperability and unlocking deployment in these areas creates new opportunities for FirstNet to leverage private investment and expand services for first responders throughout the nation—particularly in rural areas.

The largest carriers have also tried to frustrate device access by selling “locked” handsets that cannot be used once a subscriber has changed providers. While these handsets can be “unlocked,” the Copyright Office recently permitted the unlocking exemption under the Digital Millennium Copyright Act to expire. This exemption allowed subscribers to unlock their devices without fear of violating copyright law. The decision was hugely unpopular with consumers, including over 100,000 of whom petitioned the White House in an effort to reinstate the exemption. The White House responded with a sharp rebuke for the Copyright Office’s decision, explaining that “consumers should be able to unlock their cell phones without risking criminal or other penalties,” and that unlocking is “important for ensuring we continue to have the vibrant, competitive wireless market that delivers innovative products and solid service to meet consumers’ needs.”¹⁵ FCC Chairman Genachowski likewise recognized that a ban on unlocking “raises serious competition and innovation concerns.”¹⁶ I commend Members of Congress, including Members of this Committee, who have led the charge for legislation to allow consumers to unlock devices, and urge you to swiftly advance and enact such legislation.

Universal Service Fund

It should also be noted that despite years of expansion of mobile services in rural America through access to the Universal Service Fund, as well as consumers’ clear preference for mobility, the FCC, in its recent reform Order, dramatically reduced the amount of funding for mobile broadband. While wireless carriers’ contributions make up a significant portion of the Fund, only a small portion is used to deploy mobile broadband networks in rural parts of the country. As a result of this short-sighted policy decision, your rural constituents may not have access to the latest mobile broadband networks they desire. Future oversight should truly modernize the Fund by supporting consumer preferences and technologically-neutral and cost-efficient solutions. The FCC, through its administration of the Universal Service Fund, should not choose winners and losers among technologies and businesses.

Conclusion

In the end, policymakers have a fundamental choice to make. You can either act now to create a competitive framework in the marketplace to restore competition and all its benefits to the wireless industry, or act later, once the Twin Bells have solidified their duopoly, attempting to replicate those benefits through utility-style regulation. I submit that the first approach is the far better one, not just for competitive carriers, but consumers, job creation, innovation, and economic growth as well. Prompt action to preserve access to key inputs like spectrum, networks, and devices will allow wireless competition to flourish, leading to more choices for consumers, lower retail prices, better service, and greater innovation.

Thank you again for the opportunity to testify today, and I welcome your questions.

Senator PRYOR. Thank you.
Mr. Webster.

STATEMENT OF DOUG WEBSTER, VICE PRESIDENT, SERVICE PROVIDER ROUTING, MOBILITY AND VIDEO MARKETING, CISCO SYSTEMS, INC.

Mr. WEBSTER. Good afternoon, and thank you for the opportunity to appear before you today. Mr. Chairman and members of the Committee, we are in the midst of an absolute avalanche of mobile data.

I’m here representing Cisco Systems, the world leading networking company, which has unparalleled insight to network data

¹⁵ White House, “It’s Time to Legalize Cell Phone Unlocking,” Mar. 4, 2013, available at <https://petitions.whitehouse.gov/petition/make-unlocking-cell-phones-legal/1g9KhZG7>.

¹⁶ FCC, “Statement from FCC Chairman Julius Genachowski on the Copyright Office of the Library of Congress Position on DMCA and Unlocking New Cell Phones,” Mar. 4, 2013, available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0304/DOC-319250A1.pdf.

traffic. Every year, we, at Cisco, comb through the data, looking for emerging trends, and share our forecast and predictions through our annual Visual and Networking Index, or VNI.

In our latest forecast, Cisco predicts that, in 2017, mobile data in the United States will be 687 times greater than it was in 2007. Think of that: 687 times the volume of mobile data traffic, compared to just 6 years ago. And the growth shows no sign of abating.

Five years from now, there will be nine times as much mobile data traffic in the U.S. than there is today. More e-mail, more apps, and especially more video, which, by 2017, will represent two-thirds of all the mobile data traffic.

The question is, are we prepared for this avalanche? Can our current network infrastructure handle the massive growth that is coming? And the answer, of course, is no.

Imagine the Washington Beltway at rush hour. That's, basically, the wireless networks today. Sometimes open road, but frequently congested, especially at peak hours. Now imagine adding 50 percent more traffic to the Beltway each year for the next 5 years, a ninefold increase. You would get grinding gridlock with major delays, frustration, anger, and a major loss of productivity. Mr. Chairman, that's precisely what will happen if Congress and the FCC don't act to address the looming spectrum crunch.

Now, how did we get to this point? Just a few years ago, mobile data traffic was at relatively low levels, the product of a handful of text messages, mostly by our teenagers. Fast forward to a few years later, however, each of us has multiple mobile devices continuously wirelessly connected to the Internet: smartphones, tablets, laptops, video streaming devices, smart TVs, and gaming consoles, to name just a few. And the devices will continue to proliferate. In just a few years, we forecast that there will be eight devices for every American. Not only do we send e-mail and text messages constantly, but we're watching massive amounts of video, from our children's first steps to entire feature-length movies on hand-held devices.

Last week, Cisco released our latest VNI forecast, and the hard data show there is simply no stopping the growth. We've become attached to our mobile devices and have integrated them into our daily lives.

So, what should policymakers do now to ensure that we have the infrastructure and investment in place to meet this demand? Put simply, more licensed and unlicensed spectrum must be allocated for broadband access. To return to our Beltway metaphor, adding spectrum will add more lanes for traffic, widen lanes that, today, are too narrow, and create more on-ramp/off-ramps and feeder roads to reduce bottlenecks. Congress's authorization of voluntary incentive spectrum auctions in 2010 was a critical first step on the licensed side of the equation. And, on behalf of Cisco, I want to thank you for taking that meaningful action.

Now, thanks to this committee, the FCC is setting potential expansion of Wi-Fi in the 5 gigahertz band. The FCC is conducting an analysis of whether additional sharing for commercial purposes is technically feasible. We hope that this analysis can be completed as quickly and thoroughly as possible to help increase broadband speed and adoption. This is increasingly important, given that ap-

proximately 50 percent of all data moves over Wi-Fi or mobile networks, and given that Wi-Fi helps alleviate the pressure on the licensed cellular networks.

The bottom line is this. The mobile revolution is here. It's changing the way we communicate, the way we analyze data, the way healthcare, education, government, and public-safety services are delivered, and it's creating new American jobs and economic growth every day.

As if you need more reason to act, studies show that doubling mobile data results in a half-a-percent increase in the Nation's gross domestic product, growth which is necessary now more than ever. It's imperative that we address the looming spectrum crunch here in the United States and allow providers to invest private dollars in network infrastructure. This will help ensure that the United States remains at the cutting edge and continues to be a global leader when it comes to mobile technologies.

Thank you again for the opportunity to appear today, and I look forward to your questions.

[The prepared statement of Mr. Webster follows:]

PREPARED STATEMENT OF DOUG WEBSTER, VICE PRESIDENT, SERVICE PROVIDER
ROUTING, MOBILITY AND VIDEO MARKETING, CISCO SYSTEMS, INC.

Just a few years ago, mobile data traffic was at relatively small levels, the product a handful of text messages, mostly by our teenagers, some e-mail, and rudimentary web browsing. Fast forward a few years later, however, and the mobile landscape has changed, dramatically.

Many of us have multiple mobile devices—whether smartphones, tablets, or laptops, not to mention the increasing number of machine-to-machine mobile devices that work in the background of our daily lives. Not only do we send e-mail and text messages constantly, but we're watching large amounts of video—from short clips of our children's first steps to entire feature-length movies to real time video calling and video conferencing.

Taken as a whole, this change has transformed mobile traffic, with profound implications for policy.

At Cisco—the worldwide leader in networking technology for the Internet—we've been measuring these changes since 2006 through our Visual Networking Index. Our forecasts have been used by government, analysts, the media, academics, and providers to analyze the use and growth of Internet Protocol—or IP—networks worldwide. Last week, Cisco released its annual Visual Networking Index Forecast, encompassing the *mobile* traffic forecast that we published in February as well as a look at traffic growth for all types of IP traffic. While the findings may seem eye-popping, if history is a guide, they may very well be conservative. Cisco's VNI has consistently under-projected *actual* traffic levels by around 10 percent.

When you look at the numbers, it is readily apparent that mobile data has become an indispensable part of our lives, as evidenced by the findings of the Cisco Visual Networking Index:

- In 2012, U.S. mobile data traffic grew 62 percent in a single year.
- Looking forward, from 2012 to 2017, U.S. mobile data traffic will grow nearly nine times, from 2.4 exabytes to 23.2 exabytes annually. To get to those volumes, traffic will have to grow an average of 56 percent each year of the five year forecast. If the term "exabyte" is not familiar to you, 23.2 exabytes is the equivalent of nearly 6 billion DVD movies transmitted across mobile networks.
- The incremental growth in mobile data traffic added to the network in a single year from 2014 to 2015 will be larger than all the traffic that was carried on U.S. mobile networks in 2012.
- By 2017, Americans will use 1.1 billion mobile and portable devices, all employing licensed or unlicensed radio spectrum, and will use those devices to generate 70 percent of U.S. Internet traffic. The Internet has gone mobile.

Four factors are driving this rapid growth of mobile traffic on the Internet:

- (1) The number of users and connections to mobile networks is dramatically increasing. There will be 726 million mobile *connections* in the U.S. in 2017, up from 439 million in 2012, nearly 2-fold growth. That device total means there will be 2.3 devices in use for every person in the US. In addition, to multiple devices per person, mobile broadband will also support machine to machine connections—connecting not just people, but things. These machine to machine connections will be deployed into a wide variety of sectors—from energy supporting smart home energy meters as well as transmission and distribution networks, public safety supporting sensor networks and mobile video imaging, to healthcare such as home healthcare services. The number of these M2M connections will grow 4.6-fold between 2012 and 2017, reaching 323 million. And there will be more users. There will be 286 million mobile *users* in 2017, 50 million more than in 2012.
- (2) The types of devices being used to connect is advancing with the rising adoption of ever more powerful smartphones and tablets that consume more data. We are entering the era of smartphones, which dominate the device types that consumers will use. A smartphone generates 28x more mobile data traffic per month than a basic handset and by 2017, smartphones will be 52 percent of total mobile data traffic. The average smartphone today uses nearly 600 megabits of traffic per month. By 2017, the device manufacturers will be selling even more powerful 4G smartphones that we project will generate over 5 gigabits per month. They will be smarter, faster, more fun, and there will be many more things that consumers do with their smartphones than we do today.
- (3) Mobile data networks themselves are getting faster due to investment and new technology—the average mobile connection speed in the U.S. will grow 6-fold between 2012 and 2017, reaching 14.4 Mbps in 2017. While 3G connections remain the dominant way in which most of us connect to the mobile data networks, faster 4G networks will represent almost one-third of mobile connections by 2017. Significantly, that one-third of 4G connections will be responsible for generating almost two-thirds of the mobile data traffic.
- (4) Video in many forms will represent two-thirds of all mobile traffic by 2017. From YouTube, to video embedded in advertisements, to viewing video programming, to video “calls,” the consumption of video on mobile networks is skyrocketing. Mobile video traffic will grow 11-fold from 2012 to 2017, a compound annual growth rate of 63 percent. That amount of video has an enormous impact on data traffic volume, as it takes a lot of data to generate a moving, full color, crystal clear image on a screen. In 2012, the average user was generating 763 megabits of mobile data per month, which meant the average user last year consumed about 2 hours of video and made 2 video calls per month. By 2017, the average user will be consuming 6 gigabits a month—nearly eight times the 2012 levels. To generate that demand, we forecast that the average user will be using about 18 hours of video and making 10 video calls per month.

Meeting the challenges created by this massive demand requires at least two simultaneous approaches.

One obvious policy initiative is to find more spectrum. Congress led the way last year with adoption of HR 3630, creating for the first time voluntary incentive auction authority that will allow the Federal Communications Commission (FCC) to re-purpose part of the television broadcast spectrum for mobile broadband. The bill also extended the FCC's regular auction authority and made important improvements to the Commercial Spectrum Enhancement Act governing the transition of Federal spectrum to commercial use. Congress now needs to ensure that the FCC follows through on its grant of auction authority by conducting the voluntary incentive auction for broadcast spectrum as soon as possible.

The National Telecommunications and Information Administration (NTIA) is also continuing its efforts to identify Federal spectrum that can be repurposed to commercial use, with particular emphasis on the 1755–1850 MHz band that, in many countries of the world, is in use for cellular systems. Your attention to the NTIA process and progress in its talks with industry is important.

In addition, Congress has also asked the FCC to take a look at whether additional spectrum for Wi-Fi could be made available at 5 GHz. This is a very important initiative because, in addition to the exploding use of Wi-Fi, Wi-Fi networks are increasingly being used by carriers and consumers to offload mobile traffic. Our VNI

report this year indicates the trend is increasing, as carriers will increasingly embrace a solution to push their customers to Wi-Fi where possible to avoid congestion on macrocell networks. By 2017, two thirds of mobile traffic will be offloaded to small cell networks, predominantly Wi-Fi. That compares to about half the traffic today.

We appreciate this committee's interest in, and attention to, the profound changes now taking place in the mobile broadband industry. Our nation is the leader in mobile broadband. The wireless revolution spurs the construction of new high speed wireless networks. It drives the manufacturing of chips, routers, network equipment, and mobile devices such as smartphones, laptops, and tablets. It creates business and consumer software, the development of app stores, and substantial growth in electronic commerce.

Mobility has been an important driver of jobs and economic growth, and it has the potential to generate hundreds of thousands more jobs if the Federal government acts promptly to ensure that additional spectrum is made available to fuel future mobile broadband growth. It's important that the Congress understand the dynamic growth occurring in this industry, and why public policy is critical to that growth. This Committee provides an excellent platform for making these connections more obvious to all.

We thank you for your attention to this highly dynamic and important industry, which continues to be a particularly bright spot in the Nation's economy. We invite you to access the latest Cisco data for the U.S. and the world anytime at www.cisco.com/go/vni.

Senator PRYOR. Thank you.
Mr. Nagel.

**STATEMENT OF THOMAS F. NAGEL, SENIOR VICE PRESIDENT,
COMCAST CORPORATION**

Mr. NAGEL. Mr. Chairman, members of the Subcommittee, thank you for the opportunity to testify today.

I've been at Comcast for over 10 years, and one of my primary responsibilities has been the strategic development of Comcast's wireless efforts. During that time, unlicensed services, such as Wi-Fi, have grown from an in-home extension of a wired broadband to a central component of the wireless ecosystem and an important means of communication during emergencies.

I am pleased to talk about the many benefits of Wi-Fi as well as the policy steps needed to ensure that unlicensed services continue to serve as a platform for innovation, investment, and economic growth.

Comcast operates a Wi-Fi network that has expanded elevenfold in 18 months, from 5,000 access points last year to over 55,000 access points today. We also have partnered with other cable operators to build one of the country's largest Wi-Fi networks, with over 150,000 access points, and many more to come.

Because of these efforts, our customers can use any Wi-Fi-equipped device to enjoy, at high speed, wireless Internet services in many locations throughout the country. Our experience with Wi-Fi confirms the important role unlicensed services play in the wireless ecosystem. Consumers increasingly use Wi-Fi networks for cost-effective and robust wireless access to the Internet, making unlicensed spectrum a key complement to licensed wireless technologies. In fact, the CEO of Cisco recently stated that Wi-Fi will eventually carry 80 to 90 percent of the growth of cellular networks, and various studies confirm that unlicensed services contribute tens of billions of dollars in economic value each and every year.

Importantly, our Wi-Fi network has also proven to be particularly valuable during times of emergency. In the aftermath of Hurricane Sandy and Winter Storm Nemo and the tragic attack at the Boston Marathon, commercial mobile wireless networks were temporarily overloaded or, at times, down completely. In each instance, Comcast was able to open its Wi-Fi network and provide free access to anyone with a Wi-Fi-enabled device so that people could receive urgent information and establish communications with loved ones. Because of the rapid expansion of Wi-Fi-enabled devices, Wi-Fi networks like the one we operate are invaluable. They allow consumers to communicate and stay connected during emergencies, regardless of their wireless carrier. In a sense, Wi-Fi has become the interoperable communications standard for consumers.

Looking ahead, we must ensure that there is sufficient unlicensed spectrum to meet the growing consumer demand. The spectrum used to deliver Wi-Fi today has become severely congested, especially in densely populated areas. The result is significantly reduced Wi-Fi performance. If we fail to provide more spectrum for unlicensed services, we risk falling behind other nations that are preparing for next-generation Wi-Fi, often called “gigabit Wi-Fi” because of its potential to offer dramatically improved speeds.

To address these challenges, policymakers should begin by removing unnecessary regulatory barriers that prevent more efficient spectrum-sharing in the 5 gigahertz band. The current operating rules undermine the ability to fully utilize the spectrum to deliver robust unlicensed services and next-generation Wi-Fi.

Congress, the administration, and the FCC already have taken several concrete steps toward ensuring that unlicensed services continue to thrive. In particular, Comcast commends Congress for passing the landmark Spectrum Act of 2012, which took significant steps toward addressing the challenges facing both licensed and unlicensed services, including provisions that pave the way for identifying new spectrum that unlicensed services can share with existing users. Additionally, we support the FCC’s efforts in the recently initiated 5 gigahertz proceeding. This proceeding will be critical to the development of next-generation Wi-Fi. The 5 gigahertz band presents the best chance for the FCC to advance the administration’s spectrum-sharing policies. Under the proposal set forth by the FCC, unlicensed services will be able to share the spectrum without causing harmful interference to existing users, maximizing the value of spectrum for all Americans.

As Congress considers the state of the wireless ecosystem, it must ensure that this nation has a balanced spectrum policy that promotes both licensed and unlicensed uses of spectrum. Unlicensed services offer enormous economic and social benefits, and Comcast is prepared to continue to invest to help America enjoy those benefits. We are committed to working with Congress, the administration, the FCC, and other stakeholders to reach solutions that will maximize the value of unlicensed services to this Nation.

Thank you for the opportunity to testify today. I look forward to answering your questions.

[The prepared statement of Mr. Nagel follows:]

PREPARED STATEMENT OF THOMAS F. NAGEL, SENIOR VICE PRESIDENT,
COMCAST CORPORATION

Mr. Chairman and Members of the Subcommittee:

Thank you for inviting me to testify today on the state of wireless communications. I am the Senior Vice President of Business Development and Strategy for Communications and Data Services at Comcast Corporation (“Comcast”), where I have worked since 2002. In my current role, I am responsible for leading the strategic development of Comcast’s wireless services.

I welcome the opportunity to discuss the enormous potential for the continued growth of wireless services, and in particular unlicensed services such as Wi-Fi. At Comcast, we believe unlicensed spectrum is an essential input to technological innovation, investment, and economic growth. Only with access to enough unlicensed spectrum will industry be able to meet consumer demand for wireless data services. In addition, the importance of robust, widely available unlicensed networks has been made abundantly clear over the past 12 months, when Wi-Fi networks played an important role in facilitating communications in the aftermath of Hurricane Sandy, Winter Storm Nemo, and the horrific attack at the Boston Marathon. We commend Congress, the Administration, and the Federal Communications Commission (“FCC”) for already taking several concrete steps toward developing solutions that would ensure unlicensed services will continue to thrive as an essential part of the wireless ecosystem, and we are committed to working with policymakers to achieve these solutions. I want to emphasize, however, that time is of the essence. Without action in the near term, Wi-Fi networks will not have access to the spectrum they need to provide the kind of services that consumers have come to expect.

Comcast has been active in the wireless marketplace for many years. We have long recognized that a robust wireless complement to our existing broadband services would enable us to extend our network and offer more value, more flexibility, and more options to our customers. Over the years, we have explored a variety of approaches to effectively integrate wireless services into our business model.

Today, I would like to discuss our innovative strategy to provide broadband services to our customers outside the home using our Wi-Fi networks to deliver wireless services that operate over unlicensed spectrum bands. For over a decade, our residential and business customers have used Wi-Fi routers to extend high-speed Internet access throughout their homes and offices. Recently, we have deployed a network of tens of thousands of Xfinity WiFi access points throughout many portions of our footprint, accessible for no additional charge to qualified Comcast residential and business broadband customers via any Wi-Fi-enabled device. And we are partnering with other cable companies to build one of the country’s largest networks of Wi-Fi access points, which in less than two years already includes over 150,000 access points around the country. This substantial investment allows us to successfully extend our existing network in ways that make it more flexible, more interoperable, and more convenient for our customers. But it all depends on access to adequate unlicensed spectrum resources.

Our experience confirms that unlicensed technologies: (1) are a central component of the wireless ecosystem; (2) are among the most popular methods used by consumers to access the Internet; (3) contribute tens of billions of dollars of value to the Nation’s economy every year; and (4) can serve as critical sources of connectivity in times of crisis, when licensed wireless networks often cannot support heavy traffic loads or are otherwise unavailable. Americans’ demand for data services continues to grow, regardless of whether they are at home or on the go, and unlicensed services like Wi-Fi play a key role in meeting that demand. Our nation’s spectrum policy must reflect this reality by taking a balanced approach that focuses not only on spectrum for licensed services, but also on taking the necessary steps to address the current and future challenges to the continued growth of unlicensed services.

A core challenge is that the primary Wi-Fi spectrum band—the 2.4 GHz band—has become highly congested, especially in densely populated urban areas, making it harder to deliver the wireless broadband services that consumers and businesses expect. Solving this problem requires a balanced approach whereby the FCC allocates additional spectrum across a number of different bands for unlicensed use and removes regulatory roadblocks that limit the efficient use of unlicensed spectrum, such as unnecessary indoor-only restrictions, power limitations, and other technical requirements and restrictions.

As policymakers work toward this goal, it is important to recognize that supporting unlicensed technologies does not mean undermining licensed technologies. Quite the opposite is true. Licensed and unlicensed services have co-existed and complemented each other for many years. In fact, allocating additional spectrum for unlicensed use will substantially enhance the value of licensed wireless services by

helping to address the challenges associated with increased data traffic on licensed mobile networks.

Congress embraced a balanced spectrum policy and took a significant step toward addressing the challenges facing both licensed and unlicensed wireless services when it passed the Middle Class Tax Relief and Job Creation Act of 2012, which included several provisions that paved the way for unlicensed services to share new spectrum bands with existing users in a way that maximizes the efficient use of spectrum and enhances the value of spectrum for all consumers. Comcast applauds Congress for passing this landmark legislation. We also appreciate the efforts of the FCC, which already has initiated multiple proceedings to implement Congress's directives. In particular, the FCC in its 5 GHz proceeding proposes a number of essential improvements that would facilitate more efficient sharing of the 5 GHz spectrum band, thereby enabling the development of the next generation of unlicensed technologies and encouraging the deployment of robust unlicensed services.

I. Unlicensed Spectrum Provides a Platform for Investment, Innovation, and Economic Growth

Consumers today expect access to content and information anytime, anywhere, and via any device, and unlicensed spectrum has been a key catalyst to this revolution. The explosive growth of services and devices using unlicensed spectrum, including Wi-Fi, Bluetooth, RFID, and smart grid applications, among many others, has been remarkable. These services have greatly benefitted consumers, created billions of dollars of economic value, supported millions of jobs, and provided a platform for even more innovation and investment.¹ Wi-Fi in particular is now an integral part of daily life and a service upon which consumers and businesses—including mobile network operators—increasingly rely for cost-effective and robust wireless broadband access to the Internet. In light of the extremely positive economic and societal effects of unlicensed services, it is no surprise that there is widespread consensus among policymakers,² industry,³ and other interested parties⁴ that unlicensed services must continue to be a component of wired and wireless broadband

¹ The unlicensed model reduces regulatory and economic barriers to use of the spectrum, thereby “encouraging a deluge of technological and business model innovation” and turning unlicensed spectrum “into the most economically productive radio spectrum in the world.” Richard Thanki, *The Power of the Unlicensed Economy*, AllThingsD, July 10, 2012, available at <http://allthingsd.com/20120710/the-power-of-the-unlicensed-economy/> (“Thanki 2012 Paper”).

² See, e.g., Presidential Memorandum: Unleashing the Wireless Broadband Revolution (June 28, 2010) (ordering the Secretary of Commerce to make spectrum available for, *inter alia*, “shared access by commercial and Government users in order to enable licensed or unlicensed wireless broadband technologies to be deployed.”) (emphasis added), available at <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>; Press Release, Energy & Commerce Comm., U.S. House of Representatives, *Walden, Latta Welcome Progress on Efforts to Increase Unlicensed Spectrum* (Jan. 10, 2013), available at <http://energycommerce.house.gov/press-release/walden-latta-welcome-progress-efforts-increase-unlicensed-spectrum>; Press Release, FCC, *Statement from FCC Chairman Julius Genachowski on House Passage of Voluntary Incentive Auction Legislation* (Dec. 13, 2011) (“Unlicensed spectrum stimulates innovation, investment, and job creation in many ways, including by providing start-ups with quick access to a testbed for spectrum that is used by millions, bringing new technologies to consumers in a rapid fashion.”); *Unlicensed Operation in the TV Broadcast Bands*, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd. 16807 (2008) (Statement of Commissioner Robert McDowell) (“Robust unlicensed use of white spaces will give nimble entrepreneurs the freedom to disrupt the market in positive and constructive ways that will force incumbents to keep pace with this new revolution.”).

³ See, e.g., Comments of Motorola Solutions, Inc., ET Docket No. 13-49, at 8 (May 28, 2013) (“There is a well-documented need for additional wireless broadband spectrum, and unlicensed spectrum in particular is a key driver of innovation and economic development.”); Comments of Time Warner Cable, Inc., ET Docket No. 13-49, at 4 (May 28, 2013) (“TWC believes that a robust Wi-Fi capability provides an important complement to its existing wireline broadband network to enable its subscribers to access the Internet anywhere, anytime, on any device.”); Reply Comments of Sprint Nextel Corp., WT Docket No. 12-4, at 10 (Mar. 26, 2012) (“Wi-Fi networks that are easily—even seamlessly—accessible by customers of wireless carriers can provide users with advantages of higher-speed connections without wireless data limits.”); Joint Comments of Google, Inc. & Microsoft, Inc., GN Docket No. 12-268, at 1 (Jan. 25, 2013) (“[B]usinesses depend on access to robust licensed services as well as access to robust unlicensed spectrum resources. One without the other simply will not allow U.S. businesses to meet accelerating consumer demand for wireless products and services.”).

⁴ See, e.g., Mark Cooper, *Efficiency Gains and Consumer Benefits of Unlicensed Access to the Public Airwaves* 7 (Jan. 2012), available at www.markcooperresearch.com/SharedSpectrumAnalysis.pdf (“The unlicensed model has succeeded in supporting a large amount of economic activity in the wireless broadband space by bringing new and unique services to the market, increasing the value of broadband service by extending it to additional devices, and providing a lower cost, more efficient avenue to deliver data to consumers.”).

Internet access services. Comcast has first-hand experience with the tremendous value these services offer to consumers.

A. Comcast's Xfinity WiFi Service Uses Unlicensed Spectrum to Deliver Fast, Reliable Wireless Broadband Access

Comcast's residential and business customers have long used Wi-Fi routers in their homes and businesses to enhance the value of their wired high-speed Internet service. Over the last few years, Comcast has invested significant time, energy, and human and capital resources to bring that experience outside the home by deploying a robust Wi-Fi network that enables our customers to enjoy wireless Internet access on the go. Today, Comcast makes Xfinity WiFi available in several cities throughout the country for any consumer to access on a pay-per-use basis, and access is included for no additional charge for qualifying customers who have an Xfinity Internet or Comcast Business Internet subscription.

Comcast's efforts are really only beginning. In 2012, we expanded the Xfinity WiFi network from approximately 5,000 access points to more than 25,000 access points. So far this year, that number has increased to over 55,000 access points as we have ramped up the deployment of our network, enhancing the service in existing areas and expanding into several new regions. In fact, in the last two weeks we have expanded the Xfinity WiFi network to include hundreds of new access points in Chicago and Atlanta. And through our CableWiFi partnership with other cable operators, our customers have access to over 150,000 Wi-Fi access points throughout the country for no additional charge.⁵

We install these access points in a variety of locations that we determine will best serve our customers' needs. In addition to deploying Wi-Fi networks in retail locations, Comcast is building an extensive outdoor network to provide wireless broadband service in high-traffic areas, such as main street districts, commuter rail stations, parks, and other public areas. Xfinity WiFi deployments also serve large, high-traffic venues, such as malls, transportation centers, and sports stadiums. For example, Comcast recently made Xfinity WiFi available at Citizens Bank Park in Philadelphia as an amenity for no additional fee to any guest with a Wi-Fi-enabled device.⁶

Usage of Xfinity WiFi has grown dramatically as we have expanded its footprint. There are now more users of the Xfinity WiFi service than ever before, and they are doing more, more often, with more devices, for longer. Comcast now records as many Wi-Fi user sessions in one month as it did in the first two-and-a-half years of the Xfinity WiFi project.

B. Unlicensed Services Create Significant Value, Including to Mobile and Fixed Broadband Services

Comcast's experience is consistent with the growing body of data showing that unlicensed services create huge benefits both for broadband providers and their customers, and support significant growth in the economy as a whole.

According to a 2012 study, "a variety of approaches all point toward economic benefits [from unlicensed technologies] at least in the tens of billions of dollars a year."⁷ Additionally, a 2009 study that used consumer survey data to derive the incremental demand for broadband services attributable to Wi-Fi estimated that "Wi-Fi usage in the home, for only the purpose of broadband extension, may be generating anywhere between \$4.3 and \$12.6 billion in annual economic value for consumers in the United States."⁸ And the value of in-home Wi-Fi, hospital Wi-Fi, and RFID tags "together may generate \$16–\$37 billion per year in economic value for the U.S. economy over the next 15 years."⁹ By some accounts, unlicensed services contribute upwards of \$50 billion in annual economic growth.¹⁰

Unlicensed spectrum also adds value as a key complement to licensed wireless technologies, particularly as part of the solution to the rising demand for licensed spectrum caused by increased mobile wireless broadband traffic. According to Cisco,

⁵ See generally CableWiFi™, <http://www.cablewifi.com/> (last visited May 31, 2013).

⁶ Press Release, Comcast Corp., *Xfinity WiFi Now at Citizens Bank Park*, (Mar. 18, 2013), <http://corporate.comcast.com/comcast-voices/xfinity-wifi-now-at-citizens-bank-park>.

⁷ Paul Milgrom et al., *The Case for Unlicensed Spectrum* ¶42 (Oct. 12, 2011), available at www.stanford.edu/~idlevin/Papers/UnlicensedSpectrum.pdf.

⁸ Richard Thanki, *The Economic Value Generated by Current and Future Allocations of Unlicensed Spectrum*, Final Report, Perspective Associates 35 (Sept. 28, 2009), available at http://spectrumbridge.com/Libraries/White_Space_Primer/whitespaces-microsoft-study.sflb.ashx.

⁹ *Id.* at 42.

¹⁰ See, e.g., *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Commissioner Mignon Clyburn).

traffic on licensed mobile wireless networks increased 70 percent last year, rising from 520 petabytes per month in 2011 to over 885 petabytes per month in 2012.¹¹ Cisco expects that tremendous rate of annual growth to continue for at least the next four years.¹² Many mobile wireless broadband providers have come to recognize that, to keep up with this increasing level of demand, they will need to rely on unlicensed services to carry some of the load. As Sprint has explained, “[o]ne of the most effective methods of increasing the capacity of wireless data systems is moving data traffic, whenever possible, from the licensed spectrum of commercial mobile carriers to unlicensed spectrum, such as that now used for Wi-Fi.”¹³

The beneficial impact on licensed wireless providers and their customers resulting from Wi-Fi is staggering. The amount of mobile data offloaded to Wi-Fi networks is projected to reach 21 exabytes (or 21 billion gigabytes) by 2017.¹⁴ One study concluded that, “[i]n the absence of Wi-Fi, cellular operators would need to construct up to 450,000 new radio base stations to serve increased smartphone data traffic. This could cost \$93 billion—subjecting smartphone and tablet users to significantly higher network charges or greatly diminished service.”¹⁵

There are also positive societal benefits associated with Wi-Fi services that are not as easily quantified, but are readily apparent. This was convincingly demonstrated by Comcast’s experience during the chaotic aftermath of Hurricane Sandy and Winter Storm Nemo, and after the tragic events at the Boston Marathon. In February, I spoke about Comcast’s experience in these situations at an FCC field hearing on network reliability. Following Sandy, mobile wireless service was unavailable for large portions of the affected areas.¹⁶ In the aftermath of the storm, Comcast made approximately 20,000 Xfinity WiFi access points in ten hard-hit states and the District of Columbia available to anyone who needed them to communicate with family or friends, or otherwise to get important recovery information. Comcast recorded more than 250,000 individual sessions during that period, supporting tens of thousands of unique users while also adding a special functionality to permit non-Comcast subscribers to maintain their connection without having to refresh their credentials. Comcast took similar steps following Winter Storm Nemo, which caused widespread utility outages throughout New England and the eastern United States, and during the week after that storm, we carried almost 7 terabytes of data traffic more than we do in a normal week. Likewise, in the immediate aftermath of the attacks at the Boston Marathon, commercial mobile wireless networks were overloaded,¹⁷ but Comcast opened its network to anyone—including non-Comcast subscribers—with a Wi-Fi-enabled device to establish communications with loved ones, leading to significantly increased usage of our Xfinity WiFi network in Boston and the surrounding communities. In each instance, we opened our Wi-Fi network in full cooperation with federal, state, and local officials as they looked for ways to ease the burdens on affected individuals and public safety officials.

Comcast has opened its Xfinity WiFi network during non-emergencies as well. For example, during the 2012 Summer Olympics, Comcast offered promotional access to thousands of indoor and outdoor access points in the greater Philadelphia area, allowing anyone with a Wi-Fi-enabled device to follow the Olympic programming from London.¹⁸ Comcast also is currently offering, and has offered in the past, promotional access at Xfinity WiFi access points along the New Jersey shore, enabling consumers to conveniently surf the Web, share photos, access social media, and stream music, TV, and movies.¹⁹

¹¹ See Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017*, at 1 (Feb. 6, 2013) (“2013 Cisco Forecast”), http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf.

¹² See *id.* at 3.

¹³ Comments of Sprint Nextel Corp., WT Docket No. 12–4, at 5 (Feb. 21, 2012); see also Comments of Ericsson, ET Docket No. 13–49, at 2 (May 28, 2013) (discussing importance of technologies that “enable mobile operators to deliver supplemental small cell or stand-alone Wi-Fi” using unlicensed technologies).

¹⁴ See 2013 Cisco Forecast at 3.

¹⁵ Thanki 2012 Paper (emphasis added).

¹⁶ See, e.g., Brendan Sasso, *FCC Says Hurricane Sandy Knocked Out 25 Percent of Cell Towers in Its Path*, The Hill (Oct. 30, 2012), available at <http://thehill.com/blogs/hillicon-valley/technology/264915-fcc-hurricane-sandy-knocked-out-25-percent-of-cell-towers>.

¹⁷ See, e.g., Chloe Albanesius, *FCC Probes Post-Bombing Cell Phone Congestion in Boston*, PC Magazine (Apr. 17, 2013), available at <http://www.pcworld.com/article2/0,2817,2417891,00.asp>.

¹⁸ See J.T. Ramsay, Comcast Voices Blog, *Comcast Celebrates Live Streaming of the 2012 Olympics Games Through NBCOlympics.com, Offers Free Access to Xfinity WiFi Hot Spots* (Jul. 25, 2012), <http://corporate.comcast.com/comcast-voices/comcast-celebrates-live-streaming-of-the-2012-olympic-games-through-nbcolympicscom-offers-free-acces>.

¹⁹ See Joshua Palau, Comcast Voices Blog, *Comcast Creates Lasting Memories this Memorial Day* (May 22, 2013), <http://corporate.comcast.com/comcast-voices/12542>; J.T. Ramsay, Comcast

During emergencies and non-emergencies alike, Wi-Fi networks offer a unique opportunity for consumers to communicate and stay connected because of the accessible nature of unlicensed spectrum and unlicensed services. Almost every mobile device is now equipped with a Wi-Fi radio, so almost everyone can access a Wi-Fi network, regardless of the identity of their underlying licensed mobile carrier. Mobile wireless providers simply cannot offer access to everyone, even if they wanted to, because of the closed nature of their networks and the licensed spectrum regime. In a sense, Wi-Fi has become the interoperable communications standard for consumers.

II. Sound Spectrum Policy Must Be Designed to Encourage the Continued Growth of Unlicensed Services by Making Additional Spectrum Available for Unlicensed Use and by Removing Unnecessary Regulatory Barriers

To meet the ever-increasing consumer demand and expectations for robust Wi-Fi services, all critical stakeholders must commit to address the remaining obstacles in a timely manner. While the benefits and importance of unlicensed services like Wi-Fi are clear, there are significant challenges that threaten to impair the growth and development of such services.

Comcast has identified two primary objectives that policymakers must achieve to overcome the barriers that stand in the way of further growth and innovation in unlicensed services. First, the government must ensure that access to unlicensed spectrum grows. Second, the government must remove unnecessary regulatory barriers that impede the efficient and intensive use of existing unlicensed spectrum resources. We believe these are common sense, straightforward approaches that will facilitate the continued growth and vitality of the unlicensed sector and will return to the public significant benefits in the form of innovation, investment, and economic growth.

A. A Shortage of Usable Spectrum Hampers the Growth of Unlicensed Services

Comcast's experience shows that there are several pressing issues that must be addressed to facilitate ongoing growth and innovation in the provision of unlicensed services. Chief among these concerns is the congestion of existing unlicensed bands. Because of this congestion, the core unlicensed spectrum band is already heavily saturated in many densely populated communities. Simply put, congestion in the 2.4 GHz band will make it harder and harder for providers to deliver the kinds and quality of service that consumers have come to expect.²⁰

The congestion problems in the 2.4 GHz band are well documented. Acting Chairwoman Mignon Clyburn has pointed out that the 2.4 GHz band is particularly congested in major cities.²¹ Former FCC Chairman Julius Genachowski observed that "Wi-Fi congestion is a very real and growing problem."²² Furthermore, former Commissioner McDowell noted, "The spectrum that is used for unlicensed Wi-Fi is also experiencing congestion, which will only increase in the coming years if we do not make appropriate bands, like the 5 GHz band, more attractive for investment and innovation."²³ A paper recently published by CableLabs detailed the spectrum shortage issues: "[A]ny reasonable extrapolation of known trends leads to the conclusion that WiFi spectrum exhaust is a matter of 'when,' not 'if'. . . . In the absence of new WiFi spectrum, it is likely that wireless broadband consumers will experience reduced performance. This poses a risk to continued growth of the wireless

Voice Blog, *Surfing at the Shore Just Got Easier* (Jul. 1, 2011), <http://corporate.comcast.com/comcast-voices/surfing-at-the-shore-just-got-easier>.

²⁰ "WiFi congestion will only accelerate as the number of wireless devices continues to grow. Without additional spectrum, wireless consumers are likely to experience reduced performance, threatening the future of the wireless ecosystem." Dirk Grunwald & Kenneth Baker, *FCC Broadcast Incentive Auction: A Band Plan Framework for Maximizing Spectrum Utility* 11 (2013) (attached to Reply Comments of Nat'l Cable and Telecomms. Ass'n, GN Docket No. 12-268 (Mar. 12, 2013)); see also *Dynamic Spectrum Management*, InterDigital 8 (Oct. 2012), available at http://www.interdigital.com/wp-content/uploads/2012/10/InterDigital-DSM-White-Paper_Oct2012.pdf ("Wi-Fi currently operates in the unlicensed bands 2.4 and 5.0 GHz. . . . Wi-Fi bands are often congested, particularly in high traffic public areas.").

²¹ *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Commissioner Mignon Clyburn).

²² *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Chairman Julius Genachowski).

²³ *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Commissioner Robert McDowell).

broadband ecosystem, a central element of technology and economic policy in the United States.”²⁴ Essentially, there are so many devices using unlicensed spectrum in the 2.4 GHz band in certain locations that the result is significantly reduced Wi-Fi performance.²⁵ Further growth in data consumption via unlicensed technologies simply cannot occur unless service providers have access to more unlicensed spectrum.

B. The FCC Must Remove Regulatory Impediments to Address the Unlicensed Spectrum Crunch

Perhaps the most important unlicensed spectrum-related proceeding currently underway at the FCC focuses on the 5 GHz band. The Spectrum Act directed the FCC to launch a proceeding to modify Part 15 of the FCC’s rules to allow Unlicensed National Information Infrastructure (“U-NII”) devices to operate in the 5.350–5.450 GHz band, and directed the National Telecommunications and Information Administration (“NTIA”) to begin the process of allowing more intense sharing of the 5.350–5.450 GHz and 5.850–5.925 GHz bands between incumbent users and unlicensed services like Wi-Fi.²⁶ On February 20, 2013, the FCC issued a Notice of Proposed Rulemaking that would allow unlicensed devices to share these bands with existing users, and, critically, would update and improve the rules that govern the existing 5 GHz unlicensed bands.²⁷ Comcast commends Congress, NTIA, and the FCC for taking the necessary and significant first steps toward ensuring the availability of sufficient spectrum to encourage the continued growth, development, and proliferation of unlicensed wireless services.

As Comcast explained in our comments to the FCC, the 5 GHz band represents a crucial resource as the FCC works to alleviate the dramatic shortage in spectrum available for unlicensed services.²⁸ The 5 GHz band is the only band available for unlicensed services that can accommodate sufficiently wide channels to allow providers like Comcast to take advantage of the next generation of Wi-Fi—a new standard called 802.11ac. This standard will allow dramatically faster broadband speeds, potentially up to or in excess of one gigabit per second.²⁹ In contrast to networks using prior standards, Wi-Fi networks operating on the 802.11ac standard will support multiple data-intensive uses, such as several users simultaneously streaming HD videos, without any appreciable degradation in quality.³⁰ To realize its full potential, however, this standard requires 160 megahertz-wide channels, far wider than channels currently available in any of the spectrum bands used for unlicensed use.

The rules that currently govern the 5 GHz band significantly undermine investment today and prevent us from realizing the wide-band channels we will need to support 802.11ac.³¹ Specifically, power levels are prohibitively low in some parts of the band. Rules unnecessarily prevent any outdoor use of a large part of the band where there are no government incumbents. And government operations in another part of the band result in rules that require the use of cumbersome “listen-before-talk” technologies (also called Dynamic Frequency Selection, or “DFS”). As a result, there is only a fraction of the current 5 GHz band that providers can use for Wi-Fi networks.

Fortunately, the FCC has proposed changes to its 5 GHz rules that would make the band far more attractive to investment and build-out of unlicensed services

²⁴See Rob Alderfer, CableLabs, *WiFi Spectrum: Exhaust Looms* 5 (May 28, 2013) (included as Attachment A to Comments of Nat'l Cable & Telecomm. Ass'n, ET Docket No. 13-49 (May 28, 2013)) (“*WiFi Spectrum: Exhaust Looms*”).

²⁵See, e.g., John Cox, *Wi-Fi Devices Crowd 2.4 GHz Band; IT Looks to 5 GHz Band*, Network World (Oct. 24, 2011), <http://www.networkworld.com/news/2011/102411-wifi-unbalanced-252237.html> (“The 2.4 GHz band is congested, a symptom of the number of devices that only operate on that band, and the limitation of its [only] three non-overlapping channels.”).

²⁶See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No 112-96, § 6406, 126 Stat. 156, 231 (2012) (codified at 47 U.S.C. § 1453). U-NII devices are designed to provide short-range, high-speed wireless networking capability.

²⁷See *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (“*FCC 5 GHz Notice*”).

²⁸See Comments of Comcast Corp., ET Docket No. 13-49 at 14–17 (May 28, 2013) (“*Comcast 5 GHz Comments*”).

²⁹See Cisco, *801.11ac: The Fifth Generation of Wi-Fi Technical White Paper*, 3 (Aug. 2012), available at http://www.cisco.com/en/US/prod/collateral/wireless/ps5678/ps11983/white_paper_c11-713103.pdf.

³⁰See *id.* at 4.

³¹See *WiFi Spectrum: Exhaust Looms* at 21 (noting that “the full benefit of 802.11ac cannot be realized under the current terms of access to 5 GHz [spectrum]”).

without causing harmful interference to incumbent users.³² In the comments we filed with the FCC last week, Comcast supported the FCC's proposals to: (1) harmonize the 5 GHz U-NII-1 and U-NII-2 bands by removing an indoor-only restriction and increasing allowable power levels in the U-NII-1 band; (2) harmonize the U-NII-3 and the new U-NII-4 bands by setting the technical rules in U-NII-4 to match those of U-NII-3; and (3) update technical protections for government operations in the U-NII-2 bands but not extend DFS to either the U-NII-1 or U-NII-4 bands.³³ Devices operating in the 5 GHz bands would continue to be subject to the FCC's rules prohibiting U-NII devices from creating harmful interference to existing users.

These proposals have received widespread support from a broad range of interests, including both industry and public interest groups, because they enable more effective spectrum sharing in the 5 GHz band.³⁴ As the Administration has recognized, spectrum sharing, where technically feasible, maximizes the efficient use of spectrum and permits the simultaneous delivery of multiple services that provide significant public benefits.³⁵ The 5 GHz band is an ideal band to implement this approach: the changes the FCC has proposed will facilitate significant innovation and investment in unlicensed technologies, even while existing users may continue to use this spectrum to develop more experimental technologies that may come to fruition at some point in the future, such as the Dedicated Short-Range Communications ("DSRC") service, which enables vehicle-to-vehicle and vehicle-to-infrastructure communications-based automotive safety applications.³⁶ Notwithstanding the recent testimony by certain representatives of the auto industry before this Committee supporting the continued exclusive use of this valuable spectrum,³⁷ Comcast agrees with those in the technology and auto sectors who believe that sharing of this spectrum is possible, and that doing so would be solidly in the public interest. We urge all relevant stakeholders to pursue in good faith a spectrum sharing outcome for the 5 GHz band that will serve the public interest by protecting incumbents and unleashing a new wave of innovation and investment.

We look forward to working with Congress, the FCC, NTIA, and other stakeholders to make this vision a reality as quickly as possible.

III. Conclusion

The future of wireless is bright, and Comcast is very excited to be a part of that future. Consumer demand for wireless services—licensed and unlicensed—continues to grow at unprecedented rates, creating new opportunities to provide innovative technological solutions and drive economic growth. Unlicensed wireless services in particular have proven to be an invaluable part of the wireless ecosystem, dramatically enhancing the value of licensed wireless and fixed broadband services.

All indications are that the trends toward heavier reliance on unlicensed services will continue well into the future. Congress and the FCC have made important strides by addressing the substantial policy challenges raised by this rapid technological development. Continued growth in this area will require more spectrum to address the critical shortages that are already occurring in many locations around the country. It will also require a reevaluation of the regulations that govern unli-

³² See FCC 5 GHz Notice ¶26–28.

³³ See *Comcast 5 GHz Comments* at 21–22 (May 28, 2013) (setting forth the five principles that the FCC should adopt as it moves forward with the 5 GHz proceeding).

³⁴ See, e.g., Comments of Nat'l Cable & Telecomms. Ass'n, ET Docket No. 13–49, at 12–23 (May 28, 2013); Comments of Wireless Internet Serv. Providers Ass'n, ET Docket No. 13–49, at 6–12 (May 28, 2013); Comments of Consumer Elecs. Ass'n, ET Docket No. 13–49, at 12–14 (May 28, 2013); Comments of Cisco Systems, Inc., ET Docket No. 13–49, at 41–56 (May 28, 2013).

³⁵ See Executive Office of the President, President's Council of Advisors on Science and Technology, Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth at vi (July 2012) (“The essential element of this new Federal spectrum architecture is that the norm for spectrum use should be sharing, not exclusivity.”).

³⁶ See generally DSRC: The Future of Safer Driving Fact Sheet, Research & Innovative Tech. Admin., Dep't of Transp., http://www.its.dot.gov/factsheets/dsrc_factsheet.htm (last visited May 31, 2013) (describing DSRC technology and ongoing experimental research projects that “may have the potential to significantly reduce” the frequency of dangerous accidents in the future).

³⁷ See *The Road Ahead: Advanced Vehicle Technology and its Implications: Hearing Before the S. Comm. on Commerce, Sci., and Transp.*, 113th Cong. 6 (2013) (statement of Mitch Bainwol, President & CEO, Alliance of Automobile Manufacturers) (arguing that policymakers should “ensur[e] that the radio frequency spectrum now dedicated to V-to-V and V-to-I—the 5.9 GHz band—remains solely dedicated to auto communications technologies.”). Although Comcast appreciates the important safety benefits that such applications may someday bring, we believe that spectrum exclusivity in this band is both unreasonable and unnecessary.

censed operations, especially in the 5 GHz band. The FCC's current 5 GHz-related proceeding is a welcome development, but there is more work to be done.

Comcast is firmly committed to engaging with Congress, the Administration, and the FCC as they continue to evaluate our Nation's spectrum policy and to implement solutions that will produce even greater economic and technological growth and benefits for consumers.

Thank you for the opportunity to testify today.

Senator PRYOR. Thank you.
Mr. Ford.

**STATEMENT OF GEORGE S. FORD, PH.D., CHIEF ECONOMIST,
PHOENIX CENTER FOR ADVANCED LEGAL AND ECONOMIC
PUBLIC POLICY STUDIES**

Mr. FORD. Thank you, Mr. Chairman, for the invitation.

The wireless industry has an institutionalized complaint box at the FCC, so there's always a lively debate about various issues going on. I think, by far, the most important today is the lack of spectrum, the lack of sufficient spectrum to satisfy the demand for data over mobile wireless networks and Wi-Fi networks is—as well. I've written a lot about the spectrum issue, and I'll summarize my testimony, which covers those issues in more detail.

There are three major questions related to spectrum. One is, how much does the industry need? And I think it's suffice to say "a lot." At 500 megahertz, which is what the FCC recommended, that's twice what the mobile wireless industry has today, so that's a very significant increase in spectrum. It would be interesting to see if we can get near that number in the next couple of decades.

The next question is given the lack of fallow spectrum, where you're going to get it. And I think the answer there is, after some initial low hanging fruit, you will pry it from its present owners' hands; in some cases, from their cold, dead hands, I suspect.

There are three ways in which we can get some spectrum. We have secondary markets, in which the industry engages in transactions. That doesn't necessarily increase the amount of spectrum for wireless service, but just shifts it around into a more efficient configuration.

There are two things the FCC could do to improve the secondary market—at least two—which doesn't function all that well today. One is to increase the flexibility of use of spectrum. I think the NTIA would need to be involved with that, as well, and that way we could move spectrum around without constraints or limits on how it can be used, within the bounds of reason and technology. And, second, for the FCC to quickly approve transfers that do not have demonstrably anticompetitive effects. In some cases, these transfers are used to fund pet projects, right or wrong, in the form of voluntary conditions.

The other source of spectrum is government. There has been a huge discussion of that lately. Most of the reports I've seen on it are not promising in that regard. I think that Congress will eventually have to be involved in that process. One recent report by some advisors to the President said, "We will not"—or did not recommend ever again giving government spectrum to the private sector through auctions. That's a pretty bold statement, I think.

The other is the incentive auction, which is underway. It will be interesting to see how that works out. It's a very complicated proc-

ess, with many, many constraints and objectives. But, we do have some very smart people working on it, so there is hope.

The major question, I think, is who gets it. There's going to be too little, I think, spectrum to satisfy everyone, so there's going to be a fight over who has it, who keeps it, and who gets it. We're going to have debates over licensed and unlicensed spectrum. I think that debate can be solved relatively easily. Unlicensed spectrum, or low-powered devices, can use spectrum more flexibly than can the broadband networks—mobile broadband networks that need higher quality spectrum under an exclusive license.

The other question is how spectrum gets distributed among firms. We have the calls today for spectrum caps, participation limits by AT&T and Verizon. In the upcoming auctions, of course, people will use the government process to advantage themselves when they can, although I do think people also believe that there are valid reasons to do this.

In this regard, I think what I would say is, we need to make a decision, I think, in this country, as to whether or not we're going to use auctions, to allocate spectrum, in which the highest bidder wins the spectrum, and that's how we do things, which is how we do things in most markets, or we adopt a comparative hearing approach, where the Government chooses who gets it, in an effort to control what the industry looks like, to control market structure, control market shares, that sort of thing. And it's just a question of honesty, because, as an analyst, you kind of want to know what the objective is before you start designing rules and analyzing various policies. If we pretend to hold auctions among preselected winners, it's—it makes it difficult to really understand what it is that we're doing. Making that decision is above my pay grade, but I'm just suggesting that we have some honesty brought to the process in that regard. The—and in that capacity, economic theory is very important. When you introduce spectrum exhaust, which is what everybody's talking about right now in wireless, it radically changes the way competition works. And one of the papers—it's summarized in my testimony—is a paper entitled "Wireless Competition and Spectrum Exhaust." And what you find when an industry faces the exhaust of spectrum, that competition, in the way we normally think of it, which is a headcount of firms, is no longer a valid way to think about the industry, because if there's a constraint on capacity, you can't increase output, the role of competition is to increase output, so competition is essentially made impotent in that regard. And if you include the assumption of an economy of scale in the use of spectrum, so that capacity rises faster than the amount of spectrum that you get, which is an assumption that's widely accepted, you could actually have a case where having few firms in the industry has lower prices and better-quality services than more firms in the industry.

That's a very important addition to the analysis, so we can't simply think of it in the way we normally think of competition, which is inaccurate in itself, but, in this case, it's profoundly inaccurate.

The spectrum caps, in the past, have largely been intended to increase the number of firms, to expand the base of competitors, to add new people to the game. I don't think that's going to happen. We've had people outside the industry win spectrum. They end up

going back to the industry to try to use that spectrum—the DISH/Sprint deal, SpectrumCo selling it to Verizon, and other cases.

Additional entry is probably unlikely in—under current conditions, so we can't be thinking of having a fifth nationwide provider, for example. We need to be more worried, probably, about going from four to three, at this point, given the financial condition of some of the wireless carriers.

So, that purpose of a spectrum cap is no longer valid, and the spectrum cap, theoretically, has, to my knowledge, never been contemplated as a way to shift market share among various players. I'm probably going over—no, the clock's still running.

The other question on spectrum caps or bidding restrictions relates to revenue. This is a—this auction is intended to raise a lot of revenues for specific purposes. I think the argument that “eliminating those with very high demands for spectrum will increase revenue” is not really plausible. The theory really doesn't support it. And, in fact, the theory that's cited to support that would say you should exclude all incumbents from the auction, not just the major incumbents. And history has shown that non-incumbents have pretty high demand for spectrum, and some have made significant profits buying it and reselling it.

There are some other issues—I know I'm probably—I don't think that started on time, and people are looking at me funny—there are some other issues—you know, unlocking interoperability, those sorts of things—that are covered in my report, if you care to read it, or if you have any questions about those issues.

Thank you.

[The prepared statement of Mr. Ford follows:]

PREPARED STATEMENT OF GEORGE S. FORD, PH.D., CHIEF ECONOMIST, PHOENIX
CENTER FOR ADVANCED LEGAL AND ECONOMIC PUBLIC POLICY STUDIES

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I. Introduction and Summary of Testimony

Chairman Pryor, Ranking Member Wicker, and members of the Subcommittee, good afternoon and thank you for inviting me to testify before the Committee today.

My name is Dr. George S. Ford, and I am the Chief Economist of the Phoenix Center for Advanced Legal and Economic Public Policy Studies. I hold a Ph.D. in Economics from Auburn University, and the economics of the communications industry has been the focus of my career. Prior to joining the Phoenix Center full-time, I worked at the Federal Communications Commission as well as for several companies in the telecommunications industry, and I also serve as an Adjunct Professor at Samford University. I have written numerous research studies that explore the various complex issues facing the industry, and many of these studies were subsequently published in peer-reviewed academic journals, books and other academic outlets. Given the rapid growth of the wireless sector, a significant portion of my research has focused on understanding the underlying economics of the wireless communications industry, with a particular focus on public policy in this critical sector of the U.S. economy.

By means of introduction, the Phoenix Center is a non-profit 501(c)(3) organization that studies broad public policy issues related to governance, social and economic conditions, with a particular emphasis on publishing academic-quality research about the law and economics of regulated industries. Among other activities, the Phoenix Center publishes a PUBLIC POLICY PAPER SERIES, a POLICY BULLETIN SERIES, a POLICY PERSPECTIVES SERIES, and our blog @LAWANDECONOMICS, where we provide real-time comment on current events, as well as to highlight market examples of the relevancy of our research. Since the Phoenix Center's founding, we have published over 100 scholarly papers, with over a third of these papers published in scholarly academic journals (all of which may be downloaded free from our webpage or the Social Science Research Network). We also sponsor Congressional briefings, Policy Roundtables, educational retreats, as well as our Annual U.S. Telecoms Symposium. The Phoenix Center makes it a policy not to endorse or support any particular piece of Federal or state legislation or proposed rule. Our primary mission is not to tell you *what* to think about an issue but *how to think* about it. As such, our contributions to communications policy are decidedly more analytical than most, and we refuse to ignore the institutional realities and economic constraints of the communications business and related sectors.

II. Overview of the State of Wireless Communications

Across the globe the mobile communications revolution is well underway. From advanced economies such as the U.S., to developing economies like India, mobile telecommunications, in both voice and data forms, is quickly becoming the communications technology of choice. In the U.S., it took less than fifteen years for wireless telephones to move from a thinly consumed service to effective ubiquity.¹ At the end of 2012, there were 326.5 million mobile wireless connections in the United States, which translates to roughly 1.24 accounts for every citizen ten years of age or older.² My own forecast suggests there will be about 50 million connections added to this count in the next five years.³ While the demand for mobile service continues to skyrocket, average revenue per connection remains stable, a testament to the significant increases in industry productivity and pricing innovation.⁴

This rapid growth has its victims. Increasingly, the mobile phone is displacing more traditional land-line voice services. In each quarterly financial statement, publicly traded local telephone companies report persistent fixed-line losses. In 2012, 39 percent of households were wireless only, and that number is expected to grow by 10 percent this year.⁵ Mobile wireless has all but killed the payphone industry, and the mobile platform over time will take down and build up many other industries and industry segments. In fact, in the not so distant future, it is expected that mobile appliances—like the tablet computer—will replace traditional computers and even television for many consumers, thereby impacting the laptop and television

¹ CTIA Semi-Annual Wireless Industry Survey, CTIA: The Wireless Association (2012) (available at: <http://www.ctia.org/advocacy/research/index.cfm/AID/10316>) (hereinafter “CTIA Survey”).

²Id. Population data provided by the U.S. Census Bureau (available at: <http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>).

³Forecasts based on extrapolating a fitted Gompertz curve to the CTIA Survey data, *supra* n. 1.

⁴Industry productivity, measured crudely as connections per employee, is rising about 10 percent per year. *CTIA Survey*, *id.*

⁵L. Hettick, *Report: Wireless Substitution, VoIP Overtake ILEC Landline Dominance*, NETWORK WORLD (April 19, 2013) (available at: <http://www.networkworld.com/newsletters/converge/2013/042213convergence1.html>).

markets. For many individuals and households, mobile broadband may be the Internet connection of choice, particularly as new technologies are deployed offering speeds commensurate with that of wireline connections—but with the added bonus of mobility and near universal availability. While mobile wireless services will likely never cover every nook and cranny of the U.S.—there's neither a private nor public business case for it⁶—recent statistics show that 99.9 percent of the Nation's population and 95.3 percent of the Nation's road miles are covered by at least one mobile wireless carrier, and 99.3 percent of the population has access to two or more carriers.⁷ Coverage continues to grow as new technologies and spectrum are brought to market. Last year, the industry invested a record \$30 billion in their networks, which is \$92 of capital expenditures per connection (the equivalent of two month's revenue).

In recent years, it's been trendy to be down on the state of the U.S. communications industry, a grumbling motivated largely by the desire to expand regulation in the sector so as to favor one industry segment over another.⁸ Yet, even among the “woe is me” crowd, a negative sentiment is hard to embrace for the mobile wireless industry. Indeed, now-former FCC Chairman Julius Genachowski recently observed, “the U.S. is now the envy of the world in advanced wireless networks, devices, applications, among other areas,” a claim based on the following anecdotes: (a) the U.S. is the first country deploying 4G LTE networks at scale, and in late 2012 the U.S. had as many LTE subscribers as the rest of the world combined, making the United States the global test bed for LTE apps and services; (b) annual investment in U.S. wireless networks grew more than 40 percent between 2009 and 2012, from \$21 billion to \$30 billion while investment in European wireless networks has been flat since 2009 and wireless investment in Asia, including China, is up only 4 percent during that time; (c) more than 90 percent of smartphones sold globally in 2012 run operating systems developed by U.S. companies, up from 25 percent three years ago; (d) the new mobile apps economy is a “made in the U.S.A.” phenomenon that has created more than 500,000 U.S. jobs; and, finally (e) investments in wireless broadband infrastructure created more than 1.6 million U.S. jobs since 2007.⁹ The industry is performing well by almost all meaningful standards.

III. The Problem that Won't Go Away: Spectrum Exhaust

The explosive growth of the U.S. wireless sector is a mixed blessing. On the one hand, it provides an enormous economic boon to consumers, business, and providers, but on the other hand it is beginning to test the capacity of service providers offering such services. Data hungry services and devices strain the existing capacity of wireless networks, where the capacity is directly related to the amount of spectrum available to the firms.¹⁰ Spectrum is an essential input for providers of mobile wireless voice and data service. Indeed, without spectrum, there can be no service at all. The more spectrum that a provider has, the better are the services it can provide and the cheaper it can do so.¹¹ Unfortunately, as Americans liberally consume data with their smartphones and tablets, the U.S. is rapidly exhausting the capacity available from the existing supply of commercial spectrum. Increasingly, rationing

⁶See, e.g., G.S. Ford and L.J. Spiwak, *Justifying the Ends: Section 706 and the Regulation of Broadband*, PHOENIX CENTER POLICY PERSPECTIVE No. 12-04 (August 13, 2011) (available at: <http://www.phoenix-center.org/perspectives/Perspective12-04Final.pdf>).

⁷In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, FCC 13-34, SIXTEENTH REPORT (rel. March 21, 2013) at Table 4 (hereinafter “Sixteenth CMRS Report”).

⁸See, e.g., S. Crawford, CAPTIVE AUDIENCE: THE TELECOM INDUSTRY AND MONOPOLY POWER IN THE NEW GILDED AGE (Yale University Press 2013), Chapter 8; G.S. Ford, *Fabricating a Broadband Crisis? More Evidence on the Misleading Inferences from OECD Rankings*, PHOENIX CENTER PERSPECTIVE No. 10-05 (July 7, 2010) (available at: <http://www.phoenix-center.org/perspectives/Perspective10-05Final.pdf>).

⁹Significant FCC Actions and Key Developments in the Broadband Economy, Federal Communications Commission (March 22, 2013) (available at: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-319728A1.pdf).

¹⁰A description of the capacity limitation of mobile broadband network is provided in CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN, Federal Communications Commission (March 16, 2010) at Ch. 5 (available at: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296935A1.pdf) (hereinafter the *National Broadband Plan*) and *The Broadband Availability Gap*, OBI TECHNICAL PAPER No. 1, Federal Communications Commission (April 2010) at Ch. 4 (available at: <http://www.broadband.gov/plan/broadband-working-reports-technical-papers.html>) (hereinafter “*Broadband Availability Gap*”).

¹¹T. R. Beard, G. S. Ford, L. J. Spiwak & M. Stern, *A Policy Framework for Spectrum Allocation in Mobile Communications*, 63 FED. COMM. L.J. 639, 642 (2011) (<http://www.phoenix-center.org/papers/FCLJSpectrum.pdf>).

capacity through price and non-price methods is necessary to maintain an acceptable quality of service.

A looming “spectrum crunch” is now well established. The *National Broadband Plan* concluded that the present inventory of commercial spectrum represents “just a fraction of the amount that will be necessary to match growing demand,”¹² and proposed to make 500 Megahertz (“MHz”) of additional spectrum available by 2020 for the provision of mobile broadband services, with ideally 300 MHz of that spectrum being made available by 2015 specifically for mobile broadband services,¹³ a vision which President Obama formally endorsed by Presidential Memorandum.¹⁴ Without action, former Federal Communications Commission (“FCC”) Chairman Julius Genachowski cautioned, “network congestion will grow, and consumer frustration will grow with it.”¹⁵ The White House is also concerned, concluding that there is a “spectrum crunch that will hinder future innovation.”¹⁶ A recent technical study comparing the capabilities of 4G LTE wireless technology to meet the rapidly growing demand for mobile data concluded that “without significantly increased allocations of spectrum, wireless capacity expansion will be wholly inadequate to accommodate expected demand growth.”¹⁷ Allocating more spectrum to advanced mobile services is widely viewed as a sensible, if not a necessary, public policy.¹⁸

However, merely stating that more spectrum is to be allocated to commercial mobile services leaves some highly relevant details unresolved. There are (at least) three high-level questions that must be answered when increasing spectrum availability. They are:

1. How much additional spectrum is to be allocated to the commercial sector?
2. Where does this spectrum come from?
3. Who gets it?

As I see it, the latter two questions will be the most significant policy issues facing wireless communications in the next decade. In the following sections of my testimony, I will address each of these important questions. Of course, I will continue to study these issues in the future, and I would be happy to share my findings with you in this or some other forum.

IV. How Much Additional Spectrum Should be Allocated to Commercial Use?

How much additional spectrum does the commercial sector need? The simple answer is “a lot.” The mobile wireless industry today runs on about 500 MHz of spectrum.¹⁹ As already stated, the FCC’s *National Broadband Plan* recommended the allocation of an additional 500 MHz for commercial wireless broadband services, with 300 MHz of that going specifically to mobile wireless services. The mobile wireless industry asked for 800 MHz, and a recent study sets the figure at nearly 1,064 MHz.²⁰ These are very large numbers, and as discussed next, the “where will it come from” question is likely to be a binding constraint on how much, in the end, gets reallocated to commercial use. “As much as is possible” is likely the best answer to the first question, and this amount is likely to be too little. Thus, the solu-

¹² *National Broadband Plan*, *supra* n. 10 at 1, 10.

¹³ *Id.* at 26.

¹⁴ See Remarks by Lawrence H. Summers, *Technical Opportunities, Job Creation and Economic Growth* (June 28, 2010) (available at: <http://www.whitehouse.gov/administration/eop/nec/speeches/technological-opportunities-job-creation-economic-growth>).

¹⁵ Prepared Remarks of Chairman Julius Genachowski, Federal Communications Commission, 2011 International Consumer Electronics Show, Las Vegas, NV (January 7, 2011) (available at <http://hraunfoss.fcc.gov/edocs/public/attachmatch/DOC-303984A1.pdf>).

¹⁶ *President Obama Details Plan to Win the Future through Expanded Wireless Access*, OFFICE OF THE PRESS SECRETARY, THE WHITE HOUSE (February 10, 2011) (available at: <http://www.whitehouse.gov/the-press-office/2011/02/10/president-obama-details-plan-win-future-through-expanded-wireless-access>).

¹⁷ R.N. Clarke, *Expanding Mobile Wireless Capacity: The Challenges Presented by Technology and Economics* (January 4, 2013) (available at: <http://ssrn.com/abstract=2197416> or <http://dx.doi.org/10.2139/ssrn.2197416>).

¹⁸ Of course, without additional spectrum, higher prices can be used to ration the limited capacity, but many view this outcome as least desirable.

¹⁹ FCC Staff Technical Paper, *Mobile Broadband: The Benefits of Additional Spectrum* (Oct. 2010) at 15 (hereinafter “FCC Technical Paper”) (available at <http://download.broadband.gov/plan/fcc-staff-technicalpaper-mobile-broadband-benefits-of-additional-spectrum.pdf>) (“547 MHz, in total, is currently licensed under flexible use rules, which allows for mobile broadband and voice services.”)

²⁰ R.J. Shapiro, *The Economic Implications of Restricting Spectrum Purchases*, CENTER FOR BUSINESS & PUBLIC POLICY, GEORGETOWN UNIVERSITY (April 2013) at Table 3 (available at: http://www.gcbpp.org/files/Academic_Papers/EconImplicationsSpectrumAuctions.pdf).

tion to spectrum exhaust will require both additional spectrum, significant technological advancement in the use of spectrum, and informed public policy.²¹

V. Where Does New Spectrum Come From?

As for where the spectrum will come from the answer is obvious—it will be pried from the hands of those that already have it. The *National Broadband Plan* identified very little spectrum that is presently “fallow” and could be auctioned without much resistance, so satisfying the commercial mobile wireless industry’s need for additional spectrum will necessarily require a repurposing and reallocation of already licensed spectrum. There are three potential sources for additional commercial spectrum.

A. Secondary Market Transactions

One obvious source for additional spectrum lies in the secondary market for spectrum. At present, this market is not well functioning, but a number of recent transactions show that there are signs of life.

Secondary market transactions can be beneficial in two ways. First, it can shift the spectrum already assigned to commercial wireless services into more efficient configurations. That is, the total amount of spectrum does not increase, but is merely reallocated among carriers in a manner that permits an expansion of capacity.

Second, secondary market transactions can move spectrum assigned to some other purpose into the commercial wireless space. For example, the FCC recently permitted mobile satellite spectrum to be used for terrestrial mobile broadband service. The broadcast television incentive auctions also fall into this category.

There are a few reasons why the secondary market has been slow to develop. One factor is the limited flexibility some licensee’s face in how their spectrum can be used. Greater flexibility in licenses will help the market develop, and the FCC and NTIA should be actively pursuing ways to increase flexibility.

Another hindrance to the development of a secondary market is that the regulatory approval process for is, in most cases, far from streamlined, as the government, the applicants’ competitors, and political interests groups regularly use the regulatory process to garner concessions that they would not otherwise be able to obtain in the normal course of business.²² The use of “voluntary conditions” by the FCC in mergers and other transactions greatly diminishes the effectiveness of the secondary market to address spectrum exhaust.

On this point, I would like to call your attention to a recent POLICY PAPER of the Phoenix Center’s entitled *Taxation by Condition: Spectrum Repurposing at the FCC and the Prolonging of Spectrum Exhaust*.²³ In this paper, my co-authors and I modeled the implications of the FCC’s regulatory process wherein the agency applies value-extracting mandatory and voluntary conditions on parties to a spectrum exchange. These conditions operate much like a tax on secondary market transactions, and in that light the implications of the regulatory process are apparent. When you tax something: (1) you get less of it; and (2) you will affect what types of transactions you get. On the first point, basic economic logic tells us that taxes reduce the incentive to make transactions. “Taxing” efforts to move spectrum to higher-valued uses is a particular bad policy when facing a spectrum shortage. On the second point, the conditioning of spectrum repurposings can affect the evolution of and efficient functioning of a secondary market for commercial spectrum. That is, we may still observe many deals, but these deals will be those that attract less attention and thus fewer conditions. As such, “taxation by condition” may discourage the larger scale transactions necessary to resolve spectrum exhaust.

²¹ Of course, the definition of “commercial use” lies in the beholder, and difficult policy choices must also be made on how to balance new spectrum allocations between licensed and unlicensed use by low power devices. Both licensed and unlicensed spectrum create value; as such, providing spectrum for both uses is a good policy. The FCC is already looking at expanding unlicensed use in the 5 GHz band, and low power devices may be permissible in the duplex gap of the broadcast spectrum band plan. Low power devices are also well suited for spectrum sharing, which is a spectrum management approach we may see more of in the future. However, it is the services provided over exclusively licensed spectrum—that is, the mobile broadband services supported by billions in infrastructure investment—where spectrum exhaust is most problematic.

²² See T. Koutsky and L. Spiwak, *Separating Politics from Policy in FCC Merger Reviews: A Basic Legal Primer of The “Public Interest” Standard*, 18 COMM LAW CONSPETUS 329 (2010) (available at: <http://www.phoenix-center.org/papers/CommLawConspectusMergerStandard.pdf>).

²³ T.R. Beard, G. Ford, L. Spiwak, and M. Stern, *Taxation by Condition: Spectrum Repurposing at the FCC and the Prolonging of Spectrum Exhaust*, PHOENIX CENTER POLICY PAPER No. 44 (September 2012) (available at: <http://www.phoenix-center.org/pcpp/PCPP44Final.pdf>).

The policy implication of our analysis is clear: If the FCC wants to encourage a secondary market, then “taxing” efforts to repurpose spectrum in the form of license conditions is perhaps the worst of all policies. Instead, *barring legitimate competitive or interference concerns*, efforts to repurpose spectrum from low-to high-value uses should be expeditiously approved without extraneous conditions.

B. Repurposing Government Spectrum

One of the largest untapped sources of potential new spectrum lies with various Federal agencies which hold exclusive or primarily licenses for about half (1,687 MHz) of the “beachfront” spectrum between 225 MHz and 3.7 GHz.²⁴ While Federal agencies use spectrum in the performance of their duties, it is acknowledged, both in the U.S. and elsewhere, that public-sector users have no incentive to use their spectrum allocation efficiently.²⁵ Inefficient use implies that the government has more spectrum than it really needs, so Federal holdings are a likely source for additional spectrum for the private sector.

However, I expect significant internal resistance within the government to transfer its spectrum to commercial users (we’ve already seen it), and I predict that Congress will eventually have to get involved.²⁶ Why? First, recent reports from the government do not offer much hope for significant reallocations of spectrum any time soon.²⁷ In fact, one recent government report rejects the whole idea of reallocating Federal spectrum to the private sector.²⁸ Second, while many think of the present focus on government spectrum is a new issue, reallocating government spectrum to the private sector and improving the efficiency of government spectrum use and management is in fact a very old topic. A report by the NTIA released over two-decades ago outlines what remains to be the state-of-the-art thinking on spectrum policy reform with regard to public-sector use. Yet, essentially nothing has been done to implement the ideas. Changing a Federal license to a commercial license sets up to be a highly adversarial process, and I suspect Congress will end up in the role of final arbiter.

C. Voluntary Incentive Auctions

A promising mechanism for producing additional spectrum lies in voluntary incentive auctions, such as the one mandated by the Middle Class Tax Relief and Job Creation Act of 2012 (“Spectrum Act”). The present hope is that a large swath of broadcast television spectrum (upwards of 120 MHz) can be reallocated to mobile broadband services using the voluntary incentive auction, but whether a successful auction can be designed and implemented remains an open question. The objectives and constraints on the problem are mind boggling, and additional objectives and constraints are being proposed every day. There are some profoundly intelligent people working on it, so perhaps we can hope for the best without being labeled too optimistic.

²⁴ Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth, EXECUTIVE OFFICE OF THE PRESIDENT—PRESIDENT’S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY (July 2012) (hereinafter “PCAST Report”) at p. 8 (available at: http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf); see also A. Pai, *Too Much Government, Too Little Spectrum*, Member Diary, REDSTATE (January 3, 2013) (available at: <http://www.redstate.com/ajitpai/2013/01/03/too-much-government-too-little-spectrum>); J. Gruenwald, *Wireless Industry Already Looking Ahead for More Spectrum*, NATIONAL JOURNAL, TECHNOLOGY (February 29, 2012) (available at: <http://www.nationaljournal.com/tech/wireless-industry-already-looking-ahead-for-more-spectrum-20120229>) (quoting Charla Rath, Vice President Wireless Policy, Verizon: “ We need to be thinking about how we get a continuous supply of spectrum out there for commercial mobile wireless.”).

²⁵ PCAST Report, *id.* at p. 49.

²⁶ *Id.*

²⁷ Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband, U.S. Department of Commerce—National Telecommunications and Information Administration (October 10, 2010) (available at: http://www.ntia.doc.gov/files/ntia/publications/tenyearplan_11152010.pdf); An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675–1710 MHz, 1755–1780 MHz, 3500–3650 MHz, and 4200–4220 MHz, 4380–4400 MHz Bands, U.S. Department of Commerce—National Telecommunications and Information Administration (October 10, 2010) (available at: http://www.ntia.doc.gov/files/ntia/publications/fasttrackevaluation_11152010.pdf).

²⁸ PCAST Report, *supra* n. 24.

VI. Who Gets It? The Allocation of Additional Spectrum in the Mobile Wireless Industry

According to the most recent FCC report on competition in the mobile wireless industry, the industry has four nationwide providers and an HHI of about 2,873.²⁹ In addition to these four nationwide providers, there are a number of regional providers serving certain markets and successful at doing so. By Merger Guideline's standards, the industry is classified as "highly concentrated" since its HHI exceeds the 2,500 threshold for such classification. This "highly concentrated" label draws heightened regulatory, antitrust and Congressional scrutiny.

The data also show that AT&T and Verizon are the Nation's most successful mobile wireless firms, with each attracting the patronage of about one-third of wireless subscriptions, and about the same share of industry revenues. While the higher market shares of these two firms are simply manifestations of consumer choice, the persistent and growing relative success of the two has led some to call for policies to handicap the two larger providers in an effort to better equalize market shares among wireless providers.

Efforts to handicap the larger providers continued success and to favor the smaller providers are particularly common in current discussions about spectrum allocation. In fact, the "who gets it" question is largely about whether the FCC should allow AT&T and Verizon to get more spectrum. The monopolization narrative—that is, the fear that giving the larger providers more spectrum will eventually produce substantial market power—is now boilerplate in secondary market transactions involving AT&T and Verizon and in establishing rules for spectrum auctions.

In fact, when Congress was debating the voluntary incentive auction provisions of the Middle Class Tax Relief and Jobs Creation Act, many argued—including FCC outgoing Chairman Julius Genachowski³⁰—that the Commission should have the authority to adopt auction participation rules so that it could prevent an "excessive concentration of licenses" under Section 309(j)(3)(B) of the Communications Act to prevent the two largest CMRS providers—namely AT&T and Verizon—from participating in the auction. Congress rejected the idea, but did provide that "Nothing . . . affects any authority the Commission has to adopt and enforce rules of general applicability, including rules concerning spectrum aggregation that promote competition." Given these Congressional parameters, the FCC has subsequently issued a *Notice of Proposed Rulemaking* to modify and tighten its spectrum screen, a policy change that could create *de facto* spectrum caps and exclude the largest CMRS players from the broadcast spectrum incentive auctions.³¹ A number of constituencies and the smaller competitors of the large firms filed comments in the incentive auction docket for the Commission to establish outright bright-line spectrum cap rules.³² So did the United States Department of Justice, as I will discuss in more detail in a moment.³³

The argument for limiting AT&T and Verizon's access to additional spectrum is simply an argument for spectrum caps, whether formal or informal. The argument for spectrum caps is plain enough: spectrum caps can be used to increase the number of wireless competitors by limiting how much spectrum any one firm can hold license to.³⁴ The idea has also been extended to using spectrum caps to more evenly

²⁹ *Sixteenth CMRS Report*, *supra* n. 4 at Table 14. Other sources suggest this value may be a little high, but it has the virtue of being "official" in some sense. See, e.g., *id.*, at Table 68.

³⁰ See, e.g., Remarks of FCC Chairman Julius Genachowski 2012 Consumer Electronics Show Las Vegas (January 11, 2012) (available at: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-311974A1.pdf).

³¹ *In the Matter of Policies Regarding Mobile Spectrum Holdings*, FCC 12-119, 27 FCC Red 11710, NOTICE OF PROPOSED RULEMAKING (rel. September 28, 2012).

³² See, e.g., R. Krause, *AT&T, Verizon Invite to TV Airwaves Auction Likely*, INVESTOR'S BUSINESS DAILY (March 20, 2013) (available at: <http://news.investors.com/technology/032013-648699-tmobile-sprint-seek-spectrum-limits-verizon-at-andt.htm>). Significantly, however, a coalition of broadcasters do not support incumbent exclusion rules. See, e.g., Reply Comments of The Expanding Opportunities For Broadcasters Coalition, FCC Docket No. 12-268 (March 10, 2013) (available at: <http://apps.fcc.gov/ecfs/document/view?id=7022129556>).

³³ *In the Matter of Policies Regarding Mobile Spectrum Holdings, Ex Parte Submission of the United States Department of Justice*, WT Docket No. 12-269 (April 22, 2013) (available at: <http://apps.fcc.gov/ecfs/document/view?id=7022269624>) (hereinafter "DOJ *Ex Parte*"). It should be noted that senior DOJ officials conceded under oath before the Senate Judiciary Committee that the Department made their filing after close and "quiet[!]" cooperation with the Commission. See L. Spiwak, *It's Time for FCC/DOJ Inter-Agency Cooperation to Come into the Sunlight*, @LAWANDECONOMICS (May 2, 2013) (available at: <http://phoenix-center.org/blog/archives/1356>).

³⁴ As stated by Greg Rosston, former FCC Deputy Chief Economist and, more recently, Senior Economist for Transitions at the FCC: ". . . the FCC has tools to make facilities-based competition more likely and more viable. First and foremost, the FCC should get even more spectrum out into the marketplace. And it is probably important that the spectrum not continue to go

distribute market share among established players, but I am unaware of any economic model or paper that supports this justification for a spectrum cap.

The problem with the unqualified support for spectrum caps is that the blind acceptance of the idea rest on a number of questionable assumptions, including: (1) the number of firms serving the wireless industry is determined solely by spectrum holdings; (2) the success of firms is determined solely by spectrum holdings; and (3) more equal markets shares across firms is good for consumers. None of these assumptions is sound or useful for policy. Spectrum is but one input into the production of wireless services—giving a firm spectrum does not ensure its market or financial success (as we have seen, repeatedly). In addition, the support of a spectrum cap assumes that having more firms, or more equal market shares, is always better than having few firms. Economic theory does not support this idea generally.³⁵ Also, my research shows that the argument for spectrum caps is much weaker when the existing institutional details of the wireless sector (spectrum exhaust) are considered. I will attempt to summarize that research here.

A. Understanding Equilibrium Industry Structure

As a first step, we must recognize that the number of firms supplying a market is finite and determined by economic forces, not wishful thinking. Building and maintaining a mobile wireless network, and building and maintaining a mobile wireless customer base for that matter, requires billions in capital expenditures. A carrier must secure from its customers sufficient revenues to pay operating expenses and support its large fixed costs. As the number of competitors grows, prices fall and each carrier's customer base shrinks, reducing profits. At some point, there are simply too many competitors, and the losses lead to the exit of one or more firms. This exit of firms will continue until the remaining firms are profitable—then exit stops. Or, if the number of competitors is such that the profits are large enough to support an additional firm, then entry occurs, driving down prices and profits until further entry is no longer profitable—then entry stops. Eventually, when profits are positive but not too large to support another firm, both entry and exit stop. When it does, we have what we economists refer to as an equilibrium industry structure, a concept explained for policymakers in a Phoenix Center paper published in the FEDERAL COMMUNICATIONS LAW JOURNAL entitled *Competition After Unbundling: Entry, Industry Structure and Convergence*.³⁶

In that paper, my co-authors and I observe that the equilibrium number of firms in any market will be determined by the intensity of price competition (which reflects the behavior of firms and not the count of firms), the size of the market, and the amount of fixed and sunk costs necessary to participate in the market. Large markets, other things constant, support more firms than do small markets. Markets with high fixed and sunk costs support fewer firms than do markets with low fixed and sunk costs, other things constant. Markets with aggressive price competition support fewer firms than markets with soft price competition, since lower prices mean lower profits and a diminished ability to incur the necessary capital expenditures.

Mobile wireless networks are capital intensive, and history has shown that the supply-side characteristics of the market greatly limit the number of firms that can profitably serve the market. There will always be relatively few nationwide mobile wireless carriers. This is the reality we must deal with.

The effect of the intensity of price competition on industry structure (*i.e.*, the number of firms in this case) is exceedingly relevant for public policy as it flies in the face of the typical thinking on competition. The old thinking is that the number of competitors determines the degree of competition and thus prices and profits. Modern economic theory recognizes that the intensity of price competition affects the number of competitors, implying a feedback loop between structure and performance. *Thus, in an industry such as telecommunications that requires firms to invest huge sunk and fixed costs, high industry concentration may actually be a symptom of intense price competition rather than a bellwether of weak competition.* Similarly, many competitors may be a symptom of collusion, rather than competition. It's an

into the hands of the two incumbent landline telephone companies that also have by far the most valuable wireless spectrum.” Testimony of Gregory L. Rosston, Federal Communications Commission *En Banc* Hearing on Broadband Network Management Practices (April 17, 2008) (available at: http://transition.fcc.gov/broadband_network_management/041708/rossoton.pdf).

³⁵ See, e.g., P. Cramton, E. Kwerel, G. Rosston, and A. Skrzypacz, *Using Spectrum Auctions to Enhance Competition in Wireless Services*, 54 JOURNAL OF LAW & ECONOMICS S167–S188 (2011), at p. S174.

³⁶ G. Ford, T. Koutsky and L. Spiwak, *Competition After Unbundling: Entry, Industry Structure and Convergence*, 59 FEDERAL COMMUNICATIONS LAW JOURNAL 331 (2007) (available at: <http://www.phoenix-center.org/papers/FCLJCompetitionAfterUnbundling.pdf>).

admittedly different way to think about industry structure and competition, but nevertheless a modern and legitimate one, and the *National Broadband Plan* admits as much.³⁷

What's most important about the concept of equilibrium industry structure for the policy debate is that the number of competitors in the mobile wireless market alone says nothing about the state of competition or the performance of the industry. In some cases, the FCC recognizes this fact (in others, not so much). For example, the FCC observed in its *Sixteenth CMRS Report*,

High market concentration is not synonymous with a non-competitive market or with market power—the ability to charge prices above the competitive level for a sustained period of time.³⁸

And, in the *National Broadband Plan*,

Building broadband networks—especially wireline—requires large fixed and sunk investments. Consequently, the industry will probably always have a relatively small number of facilities-based competitors, at least for wireline service. . . . The lack of a large number of wireline, facilities-based providers does not necessarily mean competition among broadband providers is inadequate. While older economic models of competition emphasized the danger of tacit collusion with a small number of rivals, economists today recognize that coordination is possible but not inevitable under such circumstances. Moreover, modern analyses find that markets with a small number of participants can perform competitively . . .³⁹

Put simply, the Commission has concluded that “concentration” bears no direct relationship with “competition.” This conclusion is profoundly significant and absolutely legitimate. This recognition is a *huge* leap forward in the agency’s thinking on competition, and an idea that needs to incorporated into everyone’s economic model of the industry. Given the costs of building networks, the industry is likely to be somewhat “concentrated” for the foreseeable future, but this does not imply a lack of competition or that regulation of the industry has anything to offer consumers, even in the absence of spectrum exhaust. Spectrum exhaust, however, adds an interesting (and unfortunately largely ignored) wrinkle to competition policy. Let me explain.

B. Wireless Competition Under Spectrum Exhaust

Despite acknowledging that spectrum exhaust is a real problem, it is readily apparent that neither the FCC nor the DOJ have incorporated spectrum exhaust into their thinking on competition and spectrum policy. In a recent paper also published in the *FEDERAL COMMUNICATIONS LAW JOURNAL—Wireless Competition Under Spectrum Exhaust*—my co-authors and I describe how competition works when firms compete under a capacity constraint.⁴⁰ The result is indeed peculiar and in some ways counterintuitive, but the result is no less valid for being so.

Our analysis of competition under spectrum exhaust is straightforward and based on common and uncontroversial assumptions about the industry. First, to sync up with common thought, we assume that price and profits fall as the number of competitors increases (that is, we adopt the Cournot Model of Competition).⁴¹ Second, we assume that there is a type of scale economy in spectrum. The DOJ explicitly accepts this technical assumption, recently stating “twice the spectrum may under certain conditions provide over twice the amount of capacity.”⁴² I have provided a figure below (Figure 1) that illustrates the results in a straightforward manner. In the figure, the equilibrium price (P^*) is on the vertical axis and the number of firms (n) is on the horizontal axis.

Let’s start with the simple case where there is no spectrum constraint so that we have some type of benchmark for comparison purposes. Without a spectrum constraint, the equilibrium price (P^*) falls as n (the number of firms) increases (along segment XYZ). This is the standard result from a common model of competition—price falls as the number of firms increases.

³⁷ *National Broadband Plan*, *supra* n. 10.

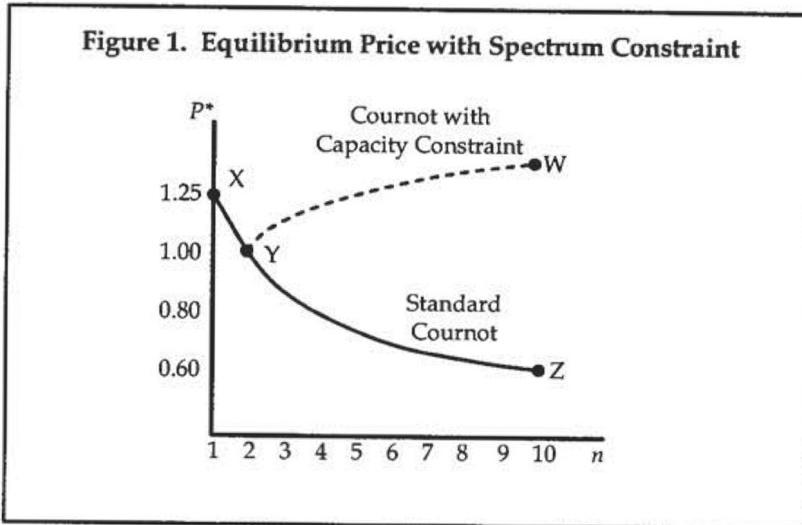
³⁸ *Sixteenth Report*, *supra* n. 7 at ¶61.

³⁹ *National Broadband Plan*, *supra* n. 10 at p. 36.

⁴⁰ T.R. Beard, G. Ford, L. Spivak and M. Stern, *Wireless Competition Under Spectrum Exhaust*, 65 *FEDERAL COMMUNICATIONS LAW JOURNAL* 79 (2012) (available at: <http://www.phoenix-center.org/FCLJSpectrumExhaust.pdf>).

⁴¹ More formally, we assume Cournot Competition in Quantities.

⁴² *DOJ Ex Parte*, *supra* n. 33 at p. 15.



Now, let's impose a binding spectrum constraint such that all capacity is used up. In other words, as much service as can be sold is sold. Significantly, once quantity is stuck at the constraint, price is stuck as well. Each quantity has a unique price associated with it per the demand curve. However, under the technical assumption about spectrum and capacity, we can get quantity unstuck by reallocating the fixed amount of spectrum to fewer firms, expanding output by taking advantage of the scale effect. Doing so increases capacity and thus output, and therefore lowers price. In the figure, the line segment labeled XYW illustrates the equilibrium price when the capacity constraint is binding. At the chosen parameter values (an arbitrary choice), the capacity constraint is binding at $n = 2$ (point Y). Thus, price falls as the number of firms increases from monopoly to duopoly, but then price rises (along segment YW) when the number of firms exceeds duopoly and the constraint is binding. So, while the standard framework holds that prices are lower with six firms than with two firms, under a spectrum constraint this need not be true. Indeed, in the figure, the six-firm outcome is essentially the same as the monopoly outcome.

Obviously, this result is significant, because when there is a spectrum constraint, the number of competitors and price begin to move in the *same* direction. That is, reducing the number of competitors leads to lower prices. Stated another way, in the fact of spectrum exhaust, *fewer competitors is good for consumers!* This result seems odd, I know, but it follows from two largely uncontroversial assumptions, and merely reflects the intuition that if a finite amount spectrum is more efficiently allocated, it can be used to create more capacity.

While I don't mean to suggest that this model is the only way to think about competition in the industry, I think most would agree that these results are very important for public policy. At a minimum, the simplistic arguments about prices and industry concentration must be abandoned in favor of a more nuanced economic model of competition. Few have done so—yet. Here's how you do it. If you find yourself thinking that prices would be lower and quality higher if there were more competitors (or a lower HHI) in the mobile wireless industry, or if someone is telling you that, then stop and recognize that there is very little to support this view and that the exact opposite may actually be true.

C. Allocating Finite Spectrum Resources

Another way to think about allocating a finite amount of spectrum among firms is to make the uncontroversial assumption that mobile wireless firms can offer higher quality and more innovative services if they have more spectrum to work with. We can think of the issue using a simple scenario. Say you have a fixed supply of spectrum—500 MHz—and you wish to allocate it. You could, theoretically, divide the spectrum among 500 firms, giving each 1 MHz, thereby having a large number of competitors (and thus low prices under the typical assumption about prices and the number of competitors). Of course, the firms could not do much if anything with

so little spectrum, and even if they could all 500 would not survive financially given the large capital expenses required to build a network over which services are provided. I think everyone would agree this allocation choice would not be wise. At the other extreme, you could give all 500 MHz to a single firm. By doing so, the firm could offer some highly advanced services, but it would do so at monopoly prices. I don't like this option any better than the other one. The policy question is, therefore, how to divide the spectrum up in the intermediate range between these two extremes.⁴³

Last year, I published another paper in *FEDERAL COMMUNICATIONS LAW JOURNAL—A Policy Framework for Spectrum Allocation in Mobile Communications*—that addressed this very issue.⁴⁴ Again, there are two key assumptions driving the analysis. First, in keeping with the widespread beliefs about competition, we again assume that the more competitors there are, the lower are prices (the Cournot assumption). Second, based on the technology of spectrum, we assume that more spectrum permits firms to offer more advanced services due to greater capacity and throughput. With the maximization of consumer welfare as our measure of good policy, the derived theoretical tradeoff is somewhat intuitive: In a setting with many firms with little spectrum, there are low prices (by the Cournot assumption) but relatively less advanced services (by the technology assumption). Alternately, in a setting with fewer firms with larger allotments of spectrum, there may be higher prices (by the Cournot assumption) but also more advanced services (by the technology assumption). There's a tradeoff, obviously, and thus the question about allocating spectrum becomes an empirical one.

Our analysis highlights several key components of the spectrum allocation decision. First, an incumbent-exclusion rule is not "pro-entry," but instead seeks to select one form (price cutting) of entry over another (quality improving). Ad nauseam, we are informed that the economic benefits of advanced wireless services are likely to be very high, but providers need more spectrum to provide such services. If mobile providers are going to provide the high-quality broadband services many feel are essential for our economic, political and social well being, then providers (not the industry) need more spectrum. With a fixed supply of spectrum, this obviously means fewer providers.

Second, with Cournot competition, the effect on price of adding more competitors is subject to diminishing marginal returns. That is, most of the price reductions from entry occur with the first two or three firms. (This fact forms the basis for the HHI thresholds in the Merger Guidelines.) When the number of firms exceeds a few, the potential for sizeable competitive price effects is low. Given that most U.S. consumers have access to four or more providers, the gains from additional entry are likely to be relatively small. Even if the price effects are moderate, these effects must be weighed against the gain in quality and innovation, which could be very large.

In light of existing conditions (e.g., spectrum exhaust and multiple mobile wireless providers), we concluded in this paper that keeping incumbent firms out of a spectrum auction (or blocking transactions) is unlikely to be helpful, where helpful is measured against the standard of consumer welfare. Today, the quality problem is likely to be more important than the price problem. In fact, under spectrum exhaust, the price issue really isn't an issue at all (as discussed above).

The tradeoff derived in the paper is intuitive. Our particular interpretation of the facts is just that—a particular interpretation. But, even if one sees the facts differently, the theoretical tradeoff remains valid and useful. If incumbent firms are precluded from obtaining more spectrum—particularly successful firms serving large customer bases—then their quality of service will suffer, and consumers will suffer. Under existing conditions that include spectrum exhaust, an attempt to pump up the number of competitors through incumbent-exclusions rules, even assuming that doing so leads to more price competition, may not (and in our view is unlikely to) make American consumers better off.

D. More Spectrum DOES NOT Mean More Competitors

In our *Policy Framework for Spectrum Allocation* paper,⁴⁵ we make another very important point that is typically ignored in the policy debate. That is, access to spectrum resources does not necessarily convey financial success, as spectrum is but one of many inputs necessary to provide service. Policymakers may want more mobile

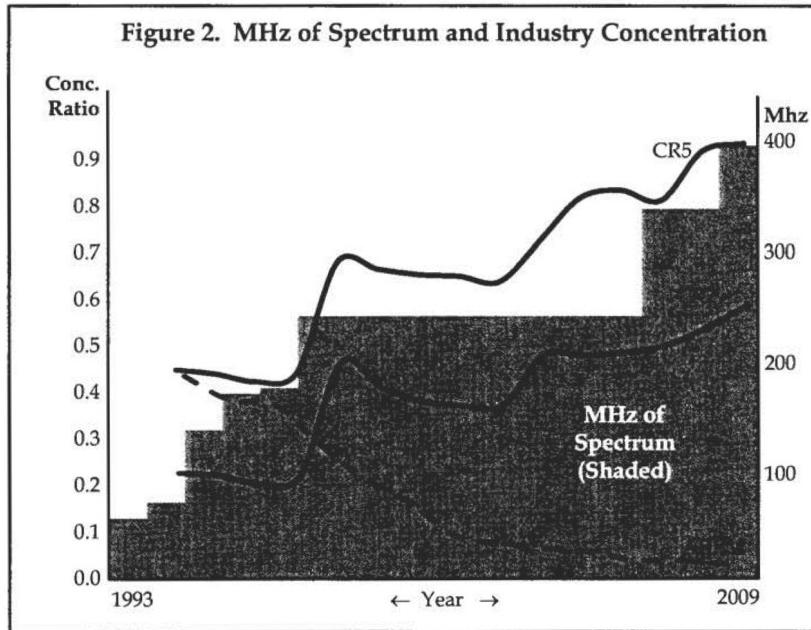
⁴³ One approach is to give spectrum to many firms, and then let them consolidate to the equilibrium. This approach is pretty much what has happened in the United States; it's just that people are getting a little uncomfortable with how far the process has gone.

⁴⁴ See *supra* n. 11.

⁴⁵ *Id.*

providers and may be willing to throw spectrum at new entrants (or smaller incumbents) in an effort to make it so. The recent DOJ *Ex Parte* filing on the incentive auction certainly has this mindset. Unfortunately, just having access to spectrum does not imply that a firm can achieve financial success. Spectrum is but one input into the production of wireless services—giving a firm spectrum does not ensure its financial success (as we have seen, repeatedly). The construction and operation of a mobile wireless network requires billions in capital expenditures every year. While the companies spend billions on spectrum in auctions and acquisitions, the data indicates that for each \$1 spent on spectrum wireless carriers spend about \$5 on network build out. As discussed above, the sizable investments in infrastructure limit the number of firms that can serve the market. The construction and operation of a nationwide mobile wireless network requires billions in capital expenditures, and these investments limit the number of firms that can serve the market, even if spectrum was abundant and free.

Moreover, history has shown that as spectrum resources have risen, the number of competitors has not. Contrary to popular belief, more spectrum does not imply more competitors. Figure 2 below illustrates the relationship between the market shares of the largest mobile telephony firms and the total MHz of spectrum made available by the FCC to such firms over the period 1993 through 2009.⁴⁶ Total spectrum is shown by the shaded area in the figure and is rising over the entire time period. In 1993, there was 50 MHz of spectrum used for mobile telephony. Including all auctioned spectrum, this number rose to 361 MHz by 2009.



The Concentration Ratio, CR_n , is used to measure industry concentration. The Concentration Ratio is computed as the sum of the n largest firms in the market. That is, CR_2 measures the summed market shares of the two largest firms, and CR_5 the market share of the five largest firms. Both the CR_2 and the CR_5 are illustrated in the figure. Finally, the average revenue per minute for mobile telephony is provided. All data is computed at the national level.

The figure shows clearly the following. First, the amount of spectrum has risen, yet industry concentration, as measured by the concentration ratio, has not declined. Thus, historical evidence does not support the notion that more spectrum means a lower level of industry concentration. Second, while concentration has risen over this interval, the price of mobile telephony has fallen consistently over the pe-

⁴⁶The figure is adapted from our paper *A Policy Framework for Spectrum Allocation in Mobile Communications, id.*

riod.⁴⁷ Therefore, historical evidence also does not support the notion that higher concentration leads to higher prices. The latter result has important implications for the theory. If changes in concentration (or the number of firms) do not impact market performance, then the gains from an incumbent-exclusion rule are likely to be small and the net losses large.

We note that these data cover many years, and technology has evolved over the years. As such, the trends in the figure are merely suggestive. Nevertheless, the historical data cannot be ignored and, if considered, provide important insights for the economic value of incumbent-exclusion policies.

E. The Department of Justice's Ex Parte Filing

As mentioned above, the FCC has recently opened a *Spectrum Screen NPRM* docket. This docket is expected to influence the upcoming incentive auction for the broadcast spectrum, mostly by excluding AT&T and Verizon from participating in that auction (or at least limiting their participation). As also mentioned above, the Department of Justice ("DOJ")—in full coordination with the FCC—filed an *Ex Parte* in the FCC *Spectrum Screen NPRM* docket encouraging the FCC to impose auction rules that exclude AT&T and Verizon from the auction in order to prop up the two smaller nationwide mobile wireless carriers, Sprint and T-Mobile.⁴⁸ Specifically, the DOJ states that the broadcast television spectrum should be allocated “to enable smaller or additional providers to mount stronger challenges to large wireless incumbents.”⁴⁹ As such, the DOJ’s filing is unquestionably an attempt to equalize competition among mobile wireless competitors.⁵⁰ It is an effort to design a market structure to their liking. Recently, Phoenix Center President Lawrence Spiwak and I published a lengthy comment on the DOJ’s filing entitled *Equalizing Competition Among Competitors: A Review of the DOJ’s Spectrum Screen Ex Parte Filing*, and I will summarize that work here.⁵¹

The primary thesis of the DOJ’s *Ex Parte* filing is that Sprint and T-Mobile should be pre-selected as the auction’s winners because AT&T and Verizon may buy the spectrum not to use but simply to keep it out of the hands of Sprint and T-Mobile. Specifically, the Department encourages the Commission to “consider the serious potential . . . that carriers with large market shares could pursue an input foreclosure strategy at auction . . . which harms all consumers of wireless services and can have an exclusionary effect on the carrier’s competitors.”⁵² There are rules against just sitting on spectrum, but let’s set that point aside for the moment and focus on this foreclosure argument.

According to the DOJ, auction bids have two possible sources: (1) use value and (2) foreclosure value. The sum of the two is the private value to the firm, which is the willingness to pay for the spectrum. “Use value” is the change in profits realized by obtaining the spectrum and using it to provide better services that consumers demand, and “foreclosure value” as the change in profits realized by keeping the spectrum out of the hands of rivals. For clarity, consider a numerical example. Say Firm A’s current profit is \$100. A block of spectrum is up for auction. If Firm A gets the spectrum, then its profits rise to \$130. If a rival of Firm A gets the spectrum, then Firm A’s profits fall to \$80. The difference between getting the spectrum and losing the spectrum is \$50, and this is the maximum willingness to pay (and maximum bid) of the spectrum in an auction. This private value to Firm A can be decomposed into \$30 of use value (\$130 – \$100) and \$20 of foreclosure value (\$100 – \$80).

As I describe in detail in the paper, the problem with the DOJ’s argument, as I see it, is that the efficiency of the auction outcome is not dependent on the presence or absence of foreclosure value. Foreclosure value merely arises from the scarcity of resources in input markets where somewhat specialized goods are sold. All incumbent firms in such cases have foreclosure value—they are worse off if their rivals get something they do not. So while the DOJ claims to embrace auctions as the best way to allocate spectrum, it in fact does so only when foreclosure values do not af-

⁴⁷ Average revenue per minute data is compiled from the FCC’s *CMRS Reports* (various years). The data is adjusted by the Consumer Price Index (www.bls.gov).

⁴⁸ *DOJ Ex Parte*, *supra* n. 33.

⁴⁹ *Id.* at p. 11–2.

⁵⁰ See, e.g., Letter from House Energy & Commerce Committee Chairman Fred Upton *et al.*, to the Federal Communications Commission (April 19, 2013) at 3 (available at: <http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/letters/20130419FCC.pdf>).

⁵¹ G. Ford and L. Spiwak, *Equalizing Competition Among Competitors: A Review of the DOJ’s Spectrum Screen Ex Parte Filing*, PHOENIX CENTER POLICY BULLETIN NO. 33 (May 2013) (available at: <http://www.phoenix-center.org/PolicyBulletin/PCPB33Final.pdf>).

⁵² *Id.* at p. 10.

fect bids. Yet, foreclosure value affects the bids of all incumbent firms, so the Department's argument is, in effect, a call to abandon spectrum auctions in favor of a comparative hearing (perhaps thinly veiled as an auction among pre-selected winners).

Furthermore, there are good reasons to suspect that the use value of the larger carriers is bigger than that of the smaller carriers. Economic theory certainly points that way, as do a number of other factors, some of which were specifically mentioned by the DOJ. Larger firms are usually larger for good reasons (e.g., greater efficiency), and they serve larger customer bases by definition. Giving inputs to a more efficient firm is a wise policy and not something to be discouraged.

Finally, as I see it, if auctions are to be used, then the presumption should be that the highest bidder wins—period. The burden of proof falls on those that want to promote a specific outcome by manipulating the auction. Auctions not only generate revenue, they allocate scarce resources to the highest bidder. The government no longer chooses who gets it, the bids do. The DOJ wants to choose the winners and craft an industry structure it likes, and to do so it calls for the FCC to favor Sprint and T-Mobile “[a]bsent compelling evidence” that AT&T and Verizon will use what spectrum they win.⁵³ I respectfully disagree. Absent compelling evidence, *do nothing*—especially when basic economic analysis suggests that the use value of the bigger firms is larger than for the smaller firms.

An auction among pre-selected winners isn't an auction, it's Kabuki Theater. If regulators, or the DOJ, want a specific outcome, then it should be upfront about it and not pretend to hold an auction. I doubt this command-and-control approach would be good for consumers, but at least a little honestly would be freshening.

F. Incumbent Exclusion Rules May Have a Potential Adverse Impact on Auction Revenue

Incumbent exclusion rules may also have an adverse impact on auction revenues. Indeed, when it comes to the upcoming voluntary incentive auctions, there are numerous hands out—*i.e.*, from this auction, we expect the proceeds to cover: (a) the cost of the auctions, the participating broadcasters' cut; (c) re-packing costs; (d) a new, interoperable first responders' network; and, oh yes, (e) revenue to pay off our spiraling deficit. Obviously, any policy that curbs revenues faces a high hurdle. Recognizing this fact, those favoring an auction among pre-selected winners have claimed that auction revenues may be larger if AT&T and Verizon are excluded. I find the argument profoundly weak, and the research typically cited for spectrum caps do not present a strong case.

For example, economist Peter Cramton, a recognized expert in auction theory, states the following: “Typically, spectrum caps lower auction revenues.”⁵⁴ Words like “typically” should generally be used to establish presumption. Dr. Cramton does suggest one possible exception, whereby “non-incumbents may be unwilling to participate in the auction, knowing that the incumbents will ultimately win.” Yet, Sprint and T-Mobile are not “non-incumbents,” they are incumbents (as are many other firms). As such, they have both use and foreclosure value for the spectrum, and it is this private value that encourages them to participate in the auction. The decision not to participate is irrational. Indeed, the small firms will bid up to their private value in an attempt to win and, if not, to keep the big firms from getting the spectrum at extremely discounted prices. The bidding is relatively costless, but beneficial whether win or lose.

In another paper often cited in regards to the revenue issue, the authors state, “revenues in unrestricted auctions do not need to be strictly higher than those in auctions with spectrum caps or set-asides.”⁵⁵ This statement of “do not need to be” is obviously not very strong support for auction rules excluding large, successful, spectrum-hungry wireless carriers. Ambiguity without evidence is not a strong motivator. Also, the theory relates only to the behavior of non-incumbents, not incumbents, and there are numerous incumbents. Also, in the same discussion, the author's note other risks, including the possibility that spectrum caps “may prohibit efficient aggregation of spectrum.”⁵⁶ Their point is similar to the one made above regarding the tradeoff between a price competition and quality improvements. As long as spectrum exhaust is a concern, the way spectrum is allocated among existing carriers is critical. Additional entry, thereby dividing up a limited amount of spectrum even further, may not be beneficial but harmful. Today, new entry into

⁵³ DOJ *Ex Parte*, *supra* n. 33, at p. 12.

⁵⁴ P. Cramton, *Spectrum Auctions*, in HANDBOOK OF TELECOMMUNICATIONS ECONOMICS (2002).

⁵⁵ Cramton, *et al.*, *supra* n. 35.

⁵⁶ *Id.*, at p. S171.

the mobile wireless market seems unlikely—the profits aren't there. So policies designed to promote additional entry are unlikely to bear much fruit.

When theory is ambiguous, the question becomes an empirical one. Empirical evidence also provides little support for the argument. In the 700 MHz auction, both AT&T and Verizon participated. The reserve price for the B block in that auction was \$1.37 billion—it sold for \$9.1 billion. The reserve block for the A block in that auction was \$1.8 billion, and it sold for \$3.96 billion. While the C Block sold for just over its reserve price, that block was encumbered with network neutrality obligations while the others were not. Notably, in the 700 MHz auction, there were 101 winning bidders.

As for non-incumbent participation, we have seen much of it in the past, and have good reason to expect it in the future. SpectrumCo, a joint venture mainly of cable companies, turned a tidy profit on AWS spectrum licenses it acquired for \$2.37 billion and sold to Verizon for \$3.9 billion.⁵⁷ The large incumbents were active participants in that auction. T-Mobile also won spectrum in that same auction, but didn't get exactly what it wanted because it was outbid on some blocks by Verizon (thereby providing motivation for Verizon's exclusion from the broadcast incentive auction). Qualcomm won licenses in the 700 MHz auction for which it paid \$558 million, and later flipped to AT&T for \$1.93 billion.⁵⁸ Thus, I suspect there will be plenty of bidders even if AT&T and Verizon participate.

VII. Other Factors Impacting the Wireless Ecosystem

Spectrum is central, but there are other issues affecting wireless policy today. The issue of handset unlocking is one that receives a great deal of attention, but its import is a mystery to me. While this issue has been perking around telecom circles for years, it has come back to the forefront as the result of the Librarian of Congress's recent decision to deny requests to exempt handset unlocking of new phones from the anti-circumvention petitions of the Digital Millennium Copyright Act ("DMCA").⁵⁹

There are a couple of things that, to me, make this issue a non-issue. First there is a popular misconception that the only thing that keeps a mobile phone from working on a competitor's network is the locking function. This assumption simply is not true. U.S. mobile providers use a variety of different technologies (CDMA, GSM, LTE, IDEN, etc.) and, as such, a handset must match the carrier's network technology. Stated in practical terms, my AT&T GSM iPhone will not work on Verizon's or Sprint's CDMA networks (and vice versa). Equally as important, many carriers make network-specific enhancements to take advantage of certain device functionalities, so a consumer may not get the full benefits of an "unlocked" smartphone if he or she tries to use it on a different network.⁶⁰

Second, under the Librarian's decision, consumers are legally free to unlock "legacy" phones, so the decision has no impact on a secondary market for phones. A simple eBay search reveals that the secondary market for handsets is thriving.

Third, most wireless carriers will unlock your phone for you, and some don't even lock them to begin with, even when subsidized.

Fourth, anyone can walk into a mobile wireless store and purchase a brand new unlocked handset. Such a device can also be purchased online, say at Amazon.com or Apple.com. Thus, it appears that the debate is not about access to an unlocked phone, but about having to pay the full price for one.

Let me put the issue into context by proving you with an example I constructed earlier this year. As you know, a state-of-the-art unlocked phone can be quite expensive—for example, according to Apple's webpage, a new entry-level unlocked iPhone 5 will run you about \$649.⁶¹ By signing a two-year contract with AT&T, however,

⁵⁷ Cable Consortium Acquires Spectrum Licenses Covering National Footprint (October 5, 2006) (available at: <http://corporate.comcast.com/news-information/news-feed/cable-consortium-acquires-spectrum-licenses-covering-national-footprint>); M. Reardon, Regulators OK Verizon's \$3.9B bid to Buy Cable Spectrum, CNET (August 16, 2012) (available at: [http://news.cnet.com/8301-13578_3-57494498-38/regulators-ok-verizon-s-\\$3.9b-bid-to-buy-cable-spectrum](http://news.cnet.com/8301-13578_3-57494498-38/regulators-ok-verizon-s-$3.9b-bid-to-buy-cable-spectrum)).

⁵⁸ See A. Sharma and A. Schatz, AT&T, Verizon In Airwaves Grab; A Win for Google? WALL STREET JOURNAL (March 21, 2008) (available at: <http://online.wsj.com/article/SB12063843805652459.html>); C. Albanesi, Qualcomm Selling 700MHz Spectrum to AT&T for \$1.93B, PCMAG (December 10, 2010) (available at: <http://www.pcmag.com/article2/0,2817,2374551,00.asp>).

⁵⁹ Library of Congress—Copyright Office, 37 CFR Part 201, Docket No. 2011-7, Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, FINAL RULE, 77 Fed Reg. 65,260 (October 26, 2012).

⁶⁰ See, e.g., ASSOCIATED PRESS, Verizon Wireless Says iPhone 5 won't be "Relocked" (September 24, 2012) (available at: <http://www.nbcnews.com/technology/verizon-wireless-says-iphone-5-wont-be-relocked-1B6078242>).

⁶¹ http://store.apple.com/us/buy/home/shop_iphone/family/iphone5.

that same phone runs you only \$199, a \$450 discount off the retail price for an unlocked phone. Not a bad deal, even considering the early termination fee of \$325, which declines by \$10 per month of the contract and need not ever be paid by adhering to the term. Of course, the ability to offer consumers heavily-discounted equipment requires the customer to stick around long enough to make the arrangement sensible for the carrier. As an incentive to adhere to the agreement made between the carrier and the customer, wireless providers typically impose early termination fees and/or “lock” the device to their networks for the duration of the contract. So, when a consumer gets a \$649 phone for \$199, is it that unreasonable to expect a little commitment from the consumer in return? Most rational adults would think not, particularly when customers freely enter into that contractual arrangement. When the contract is up, the customer is free to unlock the phone.⁶² (Indeed, so long as the phone is out of contract, a simple web search reveals that the major U.S. carriers are more than willing to unlock phones upon reasonable request.⁶³) If a consumer doesn’t like the idea of a locked phone and being bound by the terms of a service contract, then that consumer can spend \$649 up-front and get an unlocked phone. But, if the carrier hands you a \$649 phone for \$199, there’s obviously and reasonably a catch.

When it comes to things like locking, early termination fees, and contracts, it is important to keep in mind that the terms and conditions under which highly-discounted phones are provided are not arbitrary; they have a purpose. In my published paper entitled *A Policy and Economic Exploration of Wireless Carterfone Regulation*,⁶⁴ my co-authors and I provide a formal economic evaluation of contracts, device locking, and other conditions relevant to handsets. Critics are right that these terms and conditions are intended to adhere the customer to a particular carrier, but the practices are neither anti-competitive nor anti-consumer for doing so. They are motivated by a desire to better serve the customer. Such practices increase the complementarity of the handset and the services, thereby providing stronger incentives to subsidize the purchase of handsets. These market behaviors are a natural response to the desires of consumers to have the latest and greatest technology at very low prices. As such, locking, term contracts, early termination fees, and other conditions are fully compatible with competitive outcomes and a ban on such arrangements is more likely to reduce competition than it is to increase it. Without question, a ban will increase the prices for handsets and may do so without any offsetting price decrease for wireless network services. Eliminating contracts and handset locking, therefore, is likely to be a bad deal for consumers, but, in the end, that’s for the consumers to decide. I am certain that the carriers would love to be out of the handset subsidy business—it’s a cost driver for them. Yet, they do it, not because they want to, but because consumers demand it.

VIII. Conclusion

Mr. Chairman, thank you again for the invitation to testify today. I welcome any questions the Subcommittee may have.

Senator PRYOR. Thank you.

Ms. Derakhshani.

Oh, was that over?

Mr. FORD. I looked right over there and it was zero, I promise, and I thought it wasn’t working—

[Laughter.]

Mr. FORD.—I couldn’t be through 5 minutes yet.

Senator PRYOR. Ms. Derakhshani.

Thank you.

STATEMENT OF DELARA DERAKHSHANI, POLICY COUNSEL, CONSUMERS UNION

Ms. DERAKHSHANI. Chairman Pryor, Ranking Member Wicker, and members of the Subcommittee, on behalf of Consumers Union,

⁶² http://www.att.com/esupport/article.jsp?sid=KB414532&cv=820&title=What%20are%20the%20eligibility%20requirements%20for%20unlocking%20iPhone%3F#fbid=ImedV_5M2Y8.

⁶³ <http://support.apple.com/kb/ht1937>.

⁶⁴ G. Ford, T. Koutsky and L. Spiwak, *A Policy and Economic Exploration of Wireless Carterfone Regulation*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 647 (2009) (available at: <http://www.phoenix-center.org/papers/SantaClaraCarterfone.pdf>).

the policy and advocacy arm of Consumer Reports, thank you for the opportunity to testify before you today.

Consumer Reports is the world's largest independent not-for-profit product testing organization with a mission to ensure a fair and just marketplace for consumers. We appreciate being included in a conversation about wireless.

Wireless has become an essential part of consumers' lives. A growing portion of the population has chosen to cut the cord and replace their landline phones with wireless voice service, while many others, including those in rural areas, low-income areas, and communities of color, rely on their cell phones as their only means of accessing the Internet. In light of the growing importance of wireless, we'd like to highlight a number of practices that unfairly reach into consumers' pocketbooks and limit competition and consumer choice:

First, we're concerned about charges on consumers' wireless bills. We were pleased that the industry and the FCC came to a voluntary agreement on bill shock, and that carriers now provide free alerts to consumers as they approach their plan limits for data, voice, and texting, and before they incur international roaming charges. The FCC recently announced that all participating carriers are now in compliance with this voluntary agreement. At *Consumer Reports*, we plan to continue to monitor carrier performance closely to ensure that these alerts work for everyone as intended.

Unfortunately, we still have concerns about cramming, or the placement of unauthorized charges on consumers' wireless bills. Several studies have suggested that cramming costs consumers billions of dollars each year. And as we have explained in *Consumer Reports*, these charges often go unnoticed because they can be as small as 99 cents or described in a way that makes them sound like legitimate phone-related charges. We were disappointed that last year's FCC landline cramming rules did not extend to wireless. Cramming is just as serious a problem for wireless consumers, and arguably even more so in light of the ease with which it can occur. In the wireless context, all a crammer needs in order to initiate an unauthorized charge is a customer's active cell phone number. We appreciate the Committee's continued active pursuit of this concern, including the letters that Chairman Rockefeller recently sent to the four major carriers, identifying cramming as a growing threat for wireless consumers.

Third, we're concerned about the new legal barriers to unlocking cell phones. Last fall, the Library of Congress phased out the long-recognized right of consumers to unlock their mobile phones for use on other carriers' networks. As a result, what was once legally protected is now potentially subject to criminal prosecution. We're pleased that a number of members of this committee have introduced or cosponsored bills to remedy the issue.

In our view, consumers should be able to use the mobile devices that they have purchased as they see fit, and our research indicates that consumers agree. According to a nationwide poll by *Consumer Reports* in 2011, an overwhelming 96 percent of respondents felt that consumers should be able to keep their existing handsets when changing carriers; 88 percent believed that handsets should work on any cellular network that they choose.

The FCC began a proceeding last year to promote interoperability among wireless devices, and we support efforts that allow consumers to use the devices that they have purchased on any network of their choice.

Fourth, we remain concerned about the structure of traditional wireless contracts and early termination fees, which create artificial barriers to competition and consumer choice. These policies lock consumers into their contracts and deter new carriers from entering the market. When consumers have a hard time switching competitors, carriers are under less pressure to respond to consumer demands. Furthermore, when the cost of expensive devices are built into carriers' service contracts, a consumer who may not necessarily want or need a new mobile device is forced to pay for that device over the course of a long-term contract. Indeed, Consumer Reports has found that customers who are able to shop for the best deal on each of these purchases could benefit significantly from lower prices. Just recently, in March 2013, we reported, online, that consumers who switch from long-term services to no-contract services can save hundreds of dollars over a 2-year period.

Fifth, we'd like to express our continued support for the Universal Service Fund's Lifeline program. We believe that the program plays a key role in expanding the benefits of communications services to those who would otherwise be unable to afford it. We remain concerned about any proposals to exclude wireless from the Lifeline program, and we support the program's expansion to broadband. Any efforts to expand broadband access to Americans should not leave behind the communities that can benefit from it the most.

Consumers have much to gain if more spectrum is made available for commercial wireless services, but freeing up additional spectrum won't be beneficial to consumers unless future spectrum auctions actually promote competition in this market. The two largest providers of wireless services today are positioned to dominate the auctions unless the Government puts in place appropriate rules to also give small carriers the opportunity to bid on this important limited resource. Consumers will also benefit if the Government agrees to set aside sufficient spectrum for unlicensed use. These goals need to be at the forefront of any future policy decisions in order to promote competition and consumer welfare.

I thank you for the opportunity to testify, and I look forward to your questions.

[The prepared statement of Ms. Derakhshani follows:]

**PREPARED STATEMENT OF DELARA DERAKHSHANI, POLICY COUNSEL,
CONSUMERS UNION**

Chairman Pryor, Ranking Member Wicker, and Members of the Subcommittee: on behalf of Consumers Union, the policy and advocacy arm of *Consumer Reports*, thank you for the opportunity to testify before you today. *Consumer Reports* is the world's largest independent, not-for-profit product testing organization. We rate thousands of products and services annually, provide overviews and comparisons, conduct customer satisfaction surveys, and publish tips on how consumers can save money and protect themselves against abusive practices. We appreciate being included in a conversation about wireless in your ongoing examination into the state of the telecommunications market.

Introduction

Wireless service is becoming an evermore essential part of our lives. Smartphone penetration levels continue to increase,¹ and innovative new technologies and applications are improving consumers' lives in never-before-seen ways. Significantly, a growing portion of the population has chosen to "cut the cord" and replace landline phones with mobile wireless service. According to the FCC, thirty-four percent of adults lived in wireless-only households by the second half of 2012.² Others—including consumers in rural areas, low-income communities, and communities of color—rely on their cell phones as their only means of accessing the Internet. In light of the growing importance of wireless, we would like to bring attention today to a number of practices that delve into consumers' pocketbooks and limit competition and consumer choice. Some of the issues are unique to the wireless arena, while others are not; but all of them deserve attention in light consumers' heavy reliance on wireless technologies.

Our comments today are guided by three basic principles. First, all consumers should have access to quality, affordable wireless services. Second, consumers should not be unduly limited in their ability to choose among the products, service plans, and carriers that best suit their particular needs. Third, carriers should provide the tools and information necessary for consumers to make meaningful choices and protect themselves against abusive practices.

With these principles in mind, our comments today will focus on wireless bill shock and cramming, the new legal barriers to unlocking cell phones, early termination fees, the need to preserve wireless as part of the Lifeline program for low-income consumers, and spectrum policy.

Bill Shock

First, bill shock. For years, *Consumer Reports* received stories from consumers who had been hit with hundreds—even thousands—of dollars' worth of surprise charges on a single month's bill for exceeding plan limits on data, voice, and texting, or for incurring international roaming charges.³ In our view, the underlying problem was that consumers did not have the tools they needed to keep track of their plan limits. We supported action by the Federal Communications Commission (FCC) to remedy this and filed comments in its proposed rulemaking proceeding.

In October 2011, the FCC and major wireless carriers agreed to a voluntary plan under which carriers would begin providing free alerts to consumers as they approached their plan limits for data, voice, and texting—and before they incurred international roaming charges. Consumers Union joined the FCC and CTIA in announcing the agreement in 2011, and we are pleased that the FCC recently announced in April that all participating carriers are in compliance with the agreement, which protects 97 percent of the population from bill shock.

We are glad to have been part of the consumer education and advocacy process that resulted in these protections, but we plan to continue to closely monitor carrier performance and engage in a dialogue with consumers to ensure that these alerts work for everyone as intended.

Cramming

A second issue of concern is cramming, or the placement of unauthorized charges by third party services on a consumer's telephone bill. Several studies have suggested that cramming costs consumers billions of dollars each year. As we've explained in *Consumer Reports*, these charges often go unnoticed by consumers because they can be as small as 99 cents or described in a way that makes them sound like legitimate phone-related charges.

We were pleased that the FCC adopted new cramming rules last year to better help consumers identify third-party charges in the landline context. These rules require carriers to more clearly separate third-party charges from other charges on a phone bill. The new rules also require carriers to notify consumers of the option to block all third-party charges if the carrier provides that option. However, we were disappointed that the FCC did not extend these rules to wireless cramming. Cram-

¹ See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 11-186, Sixteenth Report, FCC 13-34 (rel. Mar. 21, 2013) ("Sixteenth Competition Report") (noting that 55.5 percent of mobile wireless consumers owned smartphones as of July 2012, up 41 percent from the previous year).

² Sixteenth Competition Report at 26.

³ "Bill Shock" Is Common, CONSUMERREPORTS.ORG, Jan. 2011, available at <http://www.consumerreports.org/cro/magazine-archive/2011/january/electronics/best-cell-plans-and-providers/cell-phone-bills/index.htm> (visited May 31, 2013) (finding that one in five respondents had received an unexpected charge on a bill over the past twelve months).

ming is just as serious a problem for wireless consumers—and arguably even more so in light of the ease with which it can occur. In the wireless context, for example, a crammer needs only to confirm that an active cell phone number exists before initiating an unauthorized charge.

Consumer Reports has been alerting readers to the practice of cramming and advising them to be extra vigilant in reviewing their mobile phone bills for unexplained charges. However, we strongly believe more needs to be done to help consumers identify third-party charges and to keep unauthorized charges from ending up on their bills in the first place.

We very much appreciate the Committee's active pursuit of this concern, including its 2011 investigation into cramming, as well as the letters that Chairman Rockefeller recently sent to the four major carriers identifying cramming as a growing threat for wireless consumers.⁴

Unlocking Mobile Devices

Third, we are concerned about the new legal barriers to unlocking mobile phones. Last fall, in its review of the Digital Millennium Copyright Act, the Copyright Office extinguished the long-recognized right of consumers to unlock their mobile phone for use on other carriers' networks. As a result, what had once been legally protected is now potentially subject to criminal prosecution.

Consumers Union recently sent letters to the FCC Commissioners and to the Commerce Committee, among others, encouraging efforts to remedy the uncertainty created by the Copyright Office's decision. We are pleased that President Obama has signaled a willingness to engage on this issue and that the FCC is currently looking into the matter. A number of bills have been introduced in Congress to restore the legal protection removed by the Copyright Office's decision, including bills introduced and co-sponsored by members of this committee. We thank you for your recognition of this important issue and support your efforts to craft an effective solution that benefits consumers.

In our view, consumers should be able use the mobile devices they have purchased as they see fit. For example, they should be permitted, where feasible, to adapt their mobile device for use abroad with a foreign carrier. They should be permitted to sell or give a mobile device they own to someone else for use with the carrier of the new owner's choice. And they should be able to obtain an unlocked mobile device themselves, and adapt it for use with the carrier of their choice. All of these uses make sense for consumers, and all should be legal and available.

In fact, a 2011 nationwide poll conducted by *Consumer Reports* makes it clear that consumers themselves agree. According to our poll, an overwhelming *ninety-six* percent of respondents felt that consumers should be able to keep their existing handsets when changing carriers. Furthermore, eighty-eight percent of respondents believed that their handset should work on *any* cellular network that they choose, while seventy-three percent said that they would support a government rule that requires handsets to be compatible with *all* U.S. cellular services.

For years, our organization has advocated on the related issue of interoperability. We were pleased to see the FCC begin a proceeding to promote interoperability among wireless devices last year and support efforts that allow consumers to use the devices that they have purchased on the networks of their choice.

Early Termination Fees and the Traditional Long-Term Contract

Fourth, we remain concerned about early termination fees and the structure of the traditional wireless service contract. This model builds in the cost of expensive handsets into the long-term service contract, creates artificial barriers to competition and consumer choice, and implements early termination fees that dissuade consumers from switching among mobile service providers.⁵ Although carriers generally prorate these early termination fees, customers who switch before their contract expires can still incur charges as high as \$350.⁶

⁴ Senate Committee on Commerce, Science, & Transportation, Press Release, *Rockefeller Vows to Avert Wireless Cramming Scams*, Mar. 1, 2013, available at http://www.commerce.senate.gov/public/index.cfm?p=PressReleases&ContentRecord_id=cd0edc13-b355-4d4e-9619-7035329daa1a (visited May 31, 2013).

⁵ *Sixteenth Report* at para. 308 (noting that churn rates for post-paid services are significantly lower than pre-paid contracts, due in part to existence of early termination fees).

⁶ AT&T, *Early Termination Fees*, available at <http://www.wireless.att.com/learn/articles-resources/early-term-fees.jsp> (visited May 31, 2013) (listing early termination as high as \$325 for advanced phones); Verizon Wireless, *Customer Agreement and Important Information*, available at <http://youreguide.vzw.com/legal-customer-agreement/> (visited May 31, 2013) (listing early termination fees as high as \$350 minus); Sprint, *Learn About Early Termination Fee*, available

Continued

Wireless carriers justify these fees as necessary to recoup the cost of providing consumers with mobile devices below their regular cost. But in many ways, embedding the cost of a mobile device into a contract is a bad deal for consumers. For example, under this traditional structure, a consumer is forced to pay for a new mobile device over the course of a contract even if the consumer does not want or need a new mobile device. Furthermore, early termination fees lock consumers into these long-term contracts. Although carriers argue that they have strong incentives to keep customers happy, the fact remains that if consumers have a harder time switching to a carrier's competitor, then carriers are under less pressure to respond to customer demands.

If consumers were able to shop for the best deal on each of these purchases separately, they could benefit significantly from the lower prices, improved quality, and greater innovation and variety that healthy competition would encourage among both mobile device manufacturers and wireless service providers. In Europe, for example, where LTE wireless service is sold separately from the mobile device, one study shows that the cost of the service is only about a third of its cost in the United States.⁷

We are encouraged to see that wireless carriers are beginning to consider offering consumers more innovative choices than the traditional long-term contract.⁸ This emerging development certainly appears to be catching the attention of consumers, as evidenced by a recent grass roots online petition to Verizon that argues against long-term service contracts and has garnered over 150,000 signatures.⁹

Protecting the Wireless Lifeline Program

Finally, we would like to express our continued support for the Universal Service Fund's Lifeline program. Fifteen million low-income families depend on this program, which we believe plays a key role in expanding the benefits of communications services to those who would otherwise be unable to afford them.

We recognize that the FCC recently took steps to appropriately address problems of waste, fraud, and abuse. These efforts have already resulted in \$200 million of savings and will continue to save millions, while ensuring that the funds are targeted to consumers who need telecommunications services the most.

Furthermore, we remain concerned about any proposals to exclude wireless from the Lifeline program. To do so would be to deprive the millions of low-income families who depend on cell phones for basic access to vital telecommunications services. The importance of this program is especially clear in light of the consumers' increasing shift away from landline service. As discussed earlier, many Americans are choosing to replace their landline phones with mobile phones, while others—including many consumers in rural areas—rely on their cell phones as their only means of accessing the Internet.

We support the FCC in its efforts to get affordable broadband to as many people as possible, without leaving behind low-income consumers and the groups who need it the most.

Spectrum

Consumers have much to gain if more spectrum is made available for commercial wireless services. But consumers won't be able to realize the benefits of this additional available spectrum unless future spectrum auctions actually promote competition in this market. The two largest providers of wireless services today, AT&T and

at http://support.sprint.com/support/article/Learn_about_early_termination_fee/case-sp061027-20110823-171256 (visited May 31, 2013) (listing early termination fees as high as \$350).

⁷Kevin J. O'Brien, *Americans Paying More for LTE Service*, NY TIMES, Oct. 15, 2012, available at http://www.nytimes.com/2012/10/15/technology/americans-paying-more-for-lte-service.html?_Rk=0 (visited May 31, 2013) (noting that LTE services in the U.S. cost, on average, three times the European average).

⁸For example, in January, AT&T CEO Randall Stephenson said he would consider allowing consumers to pay for their own smartphones in exchange for a lower rate. In March, T-Mobile announced a pricing plan that effectively separates the charge for the service from the charge for the device. In response, AT&T recently introduced a wireless no-contract cell service. See <http://www.att.com/gen/press-room?pid=24185&cdvn=news&newsarticleid=36421> (visited May 31, 2013). In April, Verizon CEO Lowell McAdam said he would consider ending two-year contracts if there were consumer demand for it. See Roger Cheng, *Verizon CEO Says He's Open To Dropping Contracts*, CNET News, Apr. 3, 2013, available at http://news.cnet.com/8301-1035_3-57577842-94/verizon-ceo-says-hes-open-to-dropping-contracts/ (visited May 31, 2013).

⁹See Change.org, Petition, *Verizon: Get Rid of Contracts for Wireless Services*, available at <https://www.change.org/petitions/verizon-get-rid-of-contracts-for-wireless-service> (visited May 31, 2013); Brandon Griggs, *Thousands Petition Verizon To Nix Wireless Contracts*, CNN.COM, Apr. 17, 2013, <http://www.cnn.com/2013/04/16/tech/mobile/verizon-petition-contracts/index.html> (visited May 31, 2013).

Verizon, are positioned to dominate the auctions unless the government puts in place appropriate rules to also give small carriers the opportunity to bid on this important limited resource. Consumers also will benefit if the government agrees to set aside spectrum for unlicensed uses. These goals need to be at the forefront of future spectrum policy decisions.

Conclusion

These issues highlight some of the ways in which consumers have borne the brunt of a wireless marketplace that is not as sufficiently competitive and consumer friendly. Wireless technology holds incredible promise for all of us, but policymakers and regulators play an important role in helping ensure that—as wireless technology becomes evermore prevalent in our day-to-day lives—it delivers quality, affordability, and choice to consumers. We appreciate the Subcommittee's attention to these important issues and I look forward to your questions. Thank you.

Senator PRYOR. Thank you.

Let me, if I may, just start with Mr. Webster. You spent some time, in your opening statement, talking about Wi-Fi and how important Wi-Fi is. Are you saying that the Wi-Fi space can get too crowded?

Mr. WEBSTER. Well, the Wi-Fi space actually—most certainly can get too crowded, Senator. That's why additional spectrum is needed in the unlicensed arena just as much as it is in the licensed arena. Now, there are, no question, technological innovations that can work to minimize some of that crowding, but that's not going to be enough. The growth that we are having on our networks, across the board, especially in mobility, which is really very much inherently tied to networking growth, in general, means that we're going to need additional spectrum to complement those innovations.

Senator PRYOR. I think that you mentioned the 5 gigahertz spectrum—

Mr. WEBSTER. Yes.

Senator PRYOR.—as a possible—

Mr. WEBSTER. That's correct.

Senator PRYOR.—alternate place to go. And my understanding, though, is—maybe the auto industry is trying to use that for the vehicle-to-vehicle communication. Is that right? What—

Mr. WEBSTER. That's correct. In fact, the—both the auto industry and the telecommunication industries are key customer bases or sectors of Cisco Systems, and we want to work a win-win situation—first and foremost, based on making sure that the use of this spectrum by automobiles is absolutely safe. But, if there is underutilization of spectrum, is there an opportunity to have that spectrum shared by other purposes? That's something that we very much would like to investigate and work with the FCC to see if that is an option—opportunity—so we can provide that win-win situation to both sectors.

Senator PRYOR. OK.

Mr. Nagel, same questions for you, really. Wi-Fi—you mentioned Wi-Fi in your statement. How do we manage this, going forward? I mean, it looks like more and more people want to utilize Wi-Fi; it seems to be more and more prevalent. And you talked about the flexibility of these devices, et cetera, but do you think the 5 gigahertz is the way to go?

Mr. NAGEL. Well, I think, you know, it's—when you look at what's going on in Wi-Fi, it's really no different across whether it's unlicensed or on licensed. The spectrum utilization is significantly

increasing. And I think even, you know, Mr. Webster had said that, between 6 years ago to today, the increase has been over 600 percent. And I think what happens is, the spectrum availability hasn't really increased. And so, you're getting more and more usage in the Wi-Fi space.

So, the spectrum is really the real estate. If you build more and more houses in that real estate, it just gets crammed. And I think that's where we are.

So, the importance of the 5 gigahertz is really twofold. I mean, first is, is that we already are using Wi-Fi in the 5 gigahertz space, on the high end. The second part about the 5 gigahertz—so, we can easily digest additional spectrum in that band—and that the more that we can put in the band next to our other existing spectrum, we can do wider channels. Wider channels mean faster and faster services. So, part of why the 5 gigahertz band is important to us is that it makes—it allows us to not just add more customers, but to provide more speed to those same customers. So, that's one piece.

The other piece is, when you think about the 5 gigahertz, there are very, very few, sort of, greenfield environments where you can utilize spectrum and make as much benefit in the 5 gigahertz you have today. There's about 555, sort of, allocated megahertz of spectrum in the 5 gigahertz band, but only 100 is utilized for unlicensed Wi-Fi. So, that's less than 20 percent. And so, what's great about the 5 gigahertz is, it is available. Wi-Fi can work in a sharing environment. We understand there are incumbents. We have no desire to interfere with those incumbents. Wi-Fi, by its very nature, is a secondary service. So, it's built so that it can share.

I think what's really important—you mentioned the vehicle-to-vehicle—I think what's really important is—there's no question, Mr. Webster's right, that we can solve the sharing problem with that industry. The challenge is, when you look at, sort of, that band, that the timing of how long it will take them to develop vehicle-to-vehicle is measured in, really, decades, not years, and I think we need to solve some of these problems now.

So, I think bringing us together—I think this committee could help, I think the FCC could help—but, to sort of bring us together to start solving, engineer-to-engineer, some of these basic problems so we can make sharing work.

Senator PRYOR. Mr. Berry, let me ask you. Something that you said, sort of midway through your testimony there, you—you were talking about spectrum, and you were talking about cellular market areas, which are smaller geographical areas, but I believe what you said is, you think, if they went to the cellular market area approach, that actually it might generate more revenue at auction. Could you tell the Subcommittee what you mean by that?

Mr. BERRY. Yes, Mr. Chairman, thank you.

I—the cellular market areas are smaller slices of spectrum. For the smaller carriers, they have to be able to bid and have some expectation of winning. A good example would be, Bluegrass Cellular would have—if they sold only EAs—economic areas, which is a large area—they would have to bid on markets outside Lexington, Kentucky, all the way down to Nashville, Tennessee, in order to get enough spectrum to continue their operation. That's just not do-

able. Making a small carrier bid on 5 to 6 million pops of megahertz, when they only need 1.4, is another way of putting them out of business.

And I'll give you a good example. In the 700 megahertz block that we were talking about, the C block, which was a REAG, which was large nationwide licenses—there was only 12 of those—it brought 76 cents per meg per pop. The A block, which was paired through EAs—the economic areas—it brought \$1.16. But, the paired B block, which was in CMAs—cellular market areas, 734 of them—brought \$2.68. And that's because the small carriers could actually bid and win against the largest carriers in a small area. And I think that's what we have to do if we're going to have multiple competitors in the 700—600 megahertz spectrum auction.

Senator PRYOR. Thank you.

We've been joined by Senator Thune, who's the Ranking Member of the full Committee.

And I'm going to recognize you for an opening statement and your questions.

**STATEMENT OF HON. JOHN THUNE,
U.S. SENATOR FROM SOUTH DAKOTA**

Senator THUNE. Thanks, Mr. Chairman. I want to thank you and Senator Wicker for having this hearing, and I do want to just make a statement for the record, and then perhaps follow it up with a quick question, if I might.

But, I think we all know, from our daily experiences, how important this issue is to people all across the country, whether it's a farmer in a field checking real-time commodity prices, a college student video-chatting with their family back home, or an executive on the road dealing with a crisis back at headquarters. The ability to communicate with others and to get online without being tethered by a cord is no longer a luxury for many people; it is a necessity.

Wireless communications have become an essential part of many Americans' day-to-day lives, and I am glad the Subcommittee is exploring the issue today. Without enough spectrum, the private sector will not be able to keep pace with consumer demand, which is growing exponentially. We must make it a priority to increase the availability of spectrum for commercial use, both licensed and unlicensed, as quickly as possible.

One important block to open up is the 1755–1780 megahertz band of Federal spectrum, because, when paired with the AWS-3 block, there is a global ecosystem of devices and networks that our nation can immediately tap into.

I have been working with Assistant Secretary of Commerce, Larry Strickling, the Department of Defense, and industry officials to find a commonsense solution that balances the needs of wireless consumers and of the Federal Government. It is my hope that we can find a way forward soon that allows the spectrum to be auctioned and cleared in the near future.

A recently proposed, quote, "industry roadmap" may offer us a workable path to achieving that goal. Getting more spectrum into the marketplace to the parties that value it most is ultimately the best way for Federal policymakers to encourage new services and to spur competition. Unfortunately, some voices, including the De-

partment of Justice, are calling for the Federal Communications Commission to micromanage the allocation of spectrum among wireless carriers. I stand with Chairman Upton, Chairman Walden, and other of our House colleagues who have challenged this perspective in a letter to the FCC, back in April. I believe the Commission should not pick winners or losers among individual companies, but, instead, let all interested participants freely compete against one another in the open market.

The FCC began using spectrum auctions because we recognized that the free market is more effective at allocating spectrum than relying on the opinions and predictions of unelected bureaucrats. And with the U.S. being the global leader in 4G LTE connectivity, this approach has clearly been very successful.

The Commission should focus on maximizing participation in the upcoming incentive auctions among both broadcasters and potential forward bidders. For example, one way to encourage more bidder activity in rural areas during the auction is to offer licenses in a variety of geographic sizes.

The FCC should not be distracted by proposals that could lead to less spectrum being made available and less auction proceeds being realized for national priorities, like deficit reduction and FirstNet. American consumers, including those farmers, students, and executives I mentioned earlier, are driving the mobile economy, and they, not the government, should pick who wins in the marketplace.

And if I might follow that up with a question, I would direct this to Dr. Ford. As I mentioned, my ultimate concern is for the welfare of the wireless consumers, a concern that I think a lot of my fellow members of the Committee share. You state very clearly in your opening testimony—and I want to quote—“If incumbent firms are precluded from obtaining more spectrum, particularly successful firms serving large customer bases, then their quality of service will suffer and consumers will suffer,” end quote.

Could you elaborate on how manipulating spectrum auction participation may have unintended consequences?

Mr. FORD. Sure. Well, there are many ways, but the—what I was speaking of there is: spectrum allows firms to provide service more cheaply, or more effectively, better quality, or whatever it may be, and if you limit firms with—that are demonstrably more efficient than others, if you deny them access to that resource and keep them from having a lower marginal cost, say, of providing service, then you—the consumer doesn’t realize that benefit. If giving 10 megahertz of spectrum allows a large firm to reduce its marginal cost by \$2, or a small firm by \$1, you’d obviously want to give it to the large firm, who could have the larger marginal cost reduction and pass that on to a significantly larger customer base.

So, it’s always the case, in these theoretical models of spectrum caps and spectrum allocation, that you have to think about the efficiency of who is winning the auction, who gets the spectrum. And usually, the most efficient firms will win the auction, because of that reason.

Senator THUNE. Mr. Chairman, I thank you. I want to thank the panel for their great testimony today, and allow my colleagues on this side to ask questions.

Thank you.
 Senator PRYOR. Thank you.
 Senator Klobuchar.

**STATEMENT OF HON. AMY KLOBUCHAR,
 U.S. SENATOR FROM MINNESOTA**

Senator KLOBUCHAR. Thank you very much, Mr. Chairman.
 I thought this would be a good occasion to announce that one of our members has been inducted into the Wireless Hall of Fame this fall. That would be Senator Warner.

Senator PRYOR. All right.
 Senator KLOBUCHAR. I just thought we should announce that—
 Senator PRYOR. All right.
 Senator KLOBUCHAR.—for his fine work in the business area.

[Applause.]

Senator KLOBUCHAR. I'm sure he really appreciates that I brought that up.

[Laughter.]

Senator KLOBUCHAR. No, anyway, I had some questions. But, as you all know, I've been very involved in the unlocking issue and some of the cell phone bill of rights, for many, many years, here. And, despite your sitting at, kind of, the kids' table at the end, Ms. Derakhshani, I was really appreciative of the points that you made on behalf of consumers everywhere. And could you talk about how this locking of the cell phone and service—you consider it a detriment to competition—how it can hurt consumers? I just see this as a great possibility, and I'm—of course, I'm on the bill to fix the Library of Congress decision, but I see that more as a Band Aid. And Senator Lee and Senator Blumenthal and I have a bill called the Wireless Consumer Choice Act, which goes a step farther, to ask the FCC to take action to ensure that consumers can unlock their oftentimes very expensive phones when they switch carriers. Could you talk about that, from a consumer standpoint?

Ms. DERAKHSHANI. Absolutely. We really appreciate all of the efforts of the members of this committee, and we support the Commerce Committee's approach to fix the problem through the FCC.

As you mentioned before, some of these devices are extremely expensive. We feel that, if consumers have to pay for these extremely expensive devices, then they should be able to use them in the ways that they wish. And that's really what it comes down to: giving consumers more choice.

Oftentimes, I believe that the wireless industry touts the diverse number of devices and choices available to the consumer, but that doesn't really matter if a consumer isn't able to make a meaningful choice and is not able to do that on the carrier that they wish.

Senator KLOBUCHAR. And, Mr. Largent, I know that the CTIA argued in favor of the decision by the Library of Congress, even though many of your members actually do voluntarily unlock their phones for consumers. Can you explain this stance?

Mr. LARGENT. Well, I was just going to say that there's a—there are over 600 devices that are for sale to consumers today. Many of those are sold with—not by carriers. So, they—a person can go buy an unlocked phone, today, at Best Buy, and put that on a carrier of choice. So, that ability, we support. And even the idea that a

consumer can unlock their phone that they've gotten from an AT&T or Verizon or whoever, we support that, as well.

But, the reason there's an ETF is because those phones are typically sold for \$99, \$199, and they're \$700 phones. So, there has to be an opportunity for the carrier to recoup the cost that they have of the phone. And then, once that cost is recovered, then they will freely allow their consumers to unlock their phone. And that's the policy of most of our carriers, if not all our carriers, today.

Senator KLOBUCHAR. I just know, Mr. Berry, that—and you want to respond to this a little bit—in other countries, that they unlock phones quicker and allow the service to be decoupled from the phone. And do you want to talk about how this could affect rural consumers if they are—get stuck with a certain phone and a certain carrier, more likely, and then they move and—I know this, from just driving, this week, in rural Minnesota, that certain carriers work in certain areas, and others don't.

Mr. BERRY. Yes, Senator, thank you. And thank you for the question. And thank you for all the good work you've done on unlocking.

As you know, I testified in favor of continuing the exemption for unlocking phones at the Library of Congress. And I felt that, not only was it a good pro-consumer issue to do—to focus on, but many of the rural carriers really don't have access to the iconic phones. Getting smartphones and handsets that—state-of-the-art—are very difficult for small and rural carriers. And it's one way of a rural carrier distinguishing themselves in the marketplace, and attracting a customer.

Matter of fact, one of our carriers, T-Mobile, at the time I testified, had over 2 million iPhones on their network, and they didn't sell an iPhone—they didn't have permission to sell the iPhone.

So, we think it brings consumer choice, and especially in the—a consumer that's in an urban/suburban area that moves to a rural area; they ought to be able to, not only take their iPhone, but all the content that is in that, or whatever other phone they may have—a Galaxy or Android—and bring it to the network, and utilize it. And we think that that was the right policy decision to make.

Senator KLOBUCHAR. Thank you.

Ms. Derakhshani, I'll just end with you, with just—if you want to respond to me about—I appreciate your work on cramming and bill shock, and also the important issue you raised in your testimony on wireless service transparency. Senator Blumenthal and I are working on a bill, which we introduced the last Congress, that would require wireless carriers to give consumers more complete and accurate information. Do you want to comment either in response to the comments that were made here and then also a little bit on transparency?

Ms. DERAKHSHANI. Sure. With regard to transparency, we really feel that it is the duty of carriers to provide consumers with the tools that they need to make meaningful choices. All too often, this does not happen; and consumers have told us this.

Senator KLOBUCHAR. Do you want to respond at all to the comments about the expense of the devices and the importance of unlocking?

Ms. DERAKHSHANI. Well, as I mentioned, the Honorable Mr. Largent said that—

Senator KLOBUCHAR. But, has he been inducted into the Wireless Hall of Fame?

[Laughter.]

Ms. DERAKHSHANI. I don't think he—

Senator KLOBUCHAR. OK, I just—I just wanted to point that out.

Ms. DERAKHSHANI. That wasn't pointed out earlier.

Senator CANTWELL. I can assure you, he has been inducted into a Hall of Fame, and we all appreciate that.

[Laughter and applause.]

Senator KLOBUCHAR. All right, if you could, please.

Ms. DERAKHSHANI. I will just reiterate that time and time again, I feel that the wireless industry does tout the fact that there are, as Mr. Largent mentioned, 600 different devices out there. But, what difference does that make if consumers don't have a meaningful choice among those devices? So, that's where I'll leave it.

Senator KLOBUCHAR. OK, thank you.

Ms. DERAKHSHANI. Sure.

Senator PRYOR. Thank you.

Our next three Senators will be Senator Heller, Senator Warner, and Senator Fischer.

Senator Heller.

**STATEMENT OF HON. DEAN HELLER,
U.S. SENATOR FROM NEVADA**

Senator HELLER. Thank you very much, Mr. Chairman. And thanks for the opportunity to discuss this issue that I think is critically important for our economy.

And I want to thank the witnesses for taking time and spending some time with us today, and for everybody that's in the hearing who's expressed and shown their concern for this issue, also.

I was appreciative of your testimony, Mr. Webster, as you went through some of the statistics and the growth that we're going to see in these areas, especially in data traffic and also the mobile devices that we're going to see by 2017, which, of course, underscores the need and the understanding that we need more spectrum, and that it'll all go in the hands of these wireless providers.

We all know, here, the FCC is working on a complex spectrum option right now, and we're hopeful that we can incentivize enough broadcasters to voluntarily sell their spectrum so the Government can then auction it for wireless services to the highest bidder. Hopefully, that revenue will be enough to cover and accomplish several goals. One is—of course, is enough to purchase the spectrum from the broadcasters themselves to fund FirstNet, and, hopefully there will be enough left to provide money to reduce the deficit. I mean, those are pretty aggressive goals. And, obviously, maximizing the revenue in an auction like this is key.

So, to you, Congressman Largent—and I think all of us have kind of touched about the—you know, from the Chairman to the Ranking Member, most of us are talking about revenues from this auction. And if the Government intervened, as suggested by Mr. Berry, to set up rules that limited some in the markets from entry to this auction, would that reduce the amount of revenue available?

Mr. LARGENT. Undoubtedly, it would reduce the amount of revenue that would go to the Treasury.

Senator HELLER. Are there any reasons, in your opinion, that there should be conditions set on the spectrum auction?

Mr. LARGENT. I, personally, feel like the fewer conditions that are set on the auction, the more robust and the more money you'll get from the auction. We have seen, in the 700 megahertz auction that was very complicated and just created a lot of hoops for companies to jump through in order to bid on that spectrum, what the outcomes were. We're still wrestling with the 700 megahertz A block, that Steve mentioned, because of that. And so, I just think that if you just have a clean auction with a lot of spectrum, and you let people bid on it, that you'll have the best outcome, in terms of money to the Treasury, funding FirstNet, being able to pay for the broadcasters to relocate and compensate them for their spectrum that they give up.

Senator HELLER. I'm kind of trying to keep an eye on this reverse auction portion of this. And if we don't provide the right incentives for broadcasters to sell their spectrum, we're jeopardizing the whole goal of paying—

Mr. LARGENT. Absolutely.

Senator HELLER.—for FirstNet and for bringing more meaningful spectrum to the market. In your opinion, is the FCC getting the reverse auction right?

Mr. LARGENT. I think that's yet to be seen. I'm hopeful, I'm optimistic. I've talked to people at the FCC, and, you know, there has been a lot of changes at the FCC over the last month or two, so it—that's a question yet to be answered. But, I am optimistic. I am hopeful. They understand the concerns that we have, and I think they're trying to address them.

At the end of the day, I don't—I can't give you an affirmative answer, but I'm hopeful.

Senator HELLER. Mr. Berry, I'll give you a chance to respond.

And, to myself and my constituents, I think it's important that we enjoy a robust, competitive wireless market. I believe that leads to innovation. And I also think it lowers the price point for expensive—some of these expensive devices.

And, in your testimony, you argue for a robust spectrum screen that limits the amount of spectrum a company could own, and for rules that ensure competitive carriers, that you represent, that would be able to bid on this spectrum. Can you give me some idea of what those rules would look like?

Mr. BERRY. Yes, sir, and thank you very much. I would say that the 700 megahertz spectrum auction is a—somewhat a good reference. The—well, the fewest dollars amount—fewest amount of dollars brought in by that spectrum was the largest sized spectrum. Only the largest carriers could bid on it. And it's sort of a—playing a bluff game. I don't think that we should do that.

The Charles River and Associates Study, which was provided last year, showed that unrestricted auctions actually can limit the total bidder participation and actually reduce auction revenue. As I said in my comments, I want AT&T and Verizon in the same ecosystem as our carriers, because if they do that, then our carriers were going to bid because they know they have an ecosystem that they

can participate in. They're not going to get fooled again, like they were in the lower 700 megahertz, and ended up not having the ecosystem that they could grow and build and have access to devices. If you don't have—every auction that's been conducted has had some type of rules and restrictions. And I'm really afraid that if you have an auction without any recognition that the one or two largest carriers should not walk away with the pie, then your auction rules is going to be, essentially, equivalent to, "Let the big dog eat, and let him eat all he wants." And I don't think that will bring in the most revenue to the U.S.

The 700 auction showed: CMAs brought in almost twice the amount of revenue per pop per meg as did the large aggregated, REAG areas. And I think we're going to see that again, and I think the FCC should have a device to bring certainty to the marketplace. That's what—all these carriers want certainty. And if you can have certainty on knowing what you're expected to be able to walk away with, you're going to bid more, and I think the American taxpayer will benefit from it.

Senator HELLER. Mr. Berry, thank you. And, to all the witnesses, thank you very much.

Thanks, Chairman.

Senator PRYOR. Thank you.

Senator Warner.

**STATEMENT OF HON. MARK WARNER,
U.S. SENATOR FROM VIRGINIA**

Senator WARNER. Thank you, Mr. Chairman.

Thank you, Senator Klobuchar, for that revelation you made earlier. I—it's only because I've been—I got in the wireless industry 31 years ago, and I will remind the panel—or, more my colleagues, I guess—when it started, 31 years ago, everybody in the industry, everybody on Wall Street, thought it would take us 30 years to build out a wireless network, and, at the end of that 30 years, you'd have 5 percent market penetration. I made a lot of money, because they were wrong.

[Laughter.]

Senator WARNER. But, one point I would make—and I want to kind of play off some of my colleagues' comments, because, you know, a business guy, I want to have the more—most efficient allocation, and, lord knows, we need the revenues. But, I do have to tell you, history has showed—and it was a fairly blunt instrument, what the FCC did, 31 years ago, in breaking in—the wireless block into A band and B band, wireline/non-wireline, and there was lots of consolidation. But, I can assure you, particularly in rural communities, there were large incumbent carriers that did not build out at—nearly as quickly as some of the startup or smaller companies. And there were a whole host of innovations, in terms of marketing plans, in terms of billing plans and other things, that really moved the industry along. If it had just been left to the Bell guys, the old Bell companies, I'm not sure—those original projections might have been—might have been correct.

I also make the appeal to my colleagues—and I'm going to get to a question in a moment, but I want to take this moment with folks here—that, you know, if there's one common theme as we—

we need a lot more spectrum. And I think Mr. Ford made a comment that some folks in government say, you know, "I would not agree with the President's"—and everybody who's saying that, "Never should we allow any government spectrum to be commercially used." I mean, one of the things we have tried—with, actually, Senator Snowe and I, for some time—just to get a spectrum inventory. And I would urge any of my colleagues who want to join me in this—again, we don't even know—because the Government has a disproportionate amount of spectrum—how it's being used, and how efficiently it's being used. I mean, we've gone off and done things like public safety allocations of additional spectrum, without any take-back opportunities from spectrum that may not be fully utilized to its best effect. And, you know, we need at least a road-map of where the spectrum is. And that gets us into areas with DOD and Intel and others, but a host of other public functions that, if we're going to reinforce—whether it's public safety or others—having some skin in the game, in terms of some of their spectrum, would be, I believe, a criterion.

I guess—I want to go to—Steve, to you, to put—I know where, kind of, everybody else falls down. I'm trying to put you a little more in the box, here, because I do think one potential way to try to maximize revenues, but also maximize players without some undue restriction, because we've got the big two, but then we've got the next two, and then we've got a lot of small players. How do we not just make it—if you exclude the top two, something that just defaults to, you know, T-Mobile and Sprint? But it—has CTIA taken a position on the EAs versus the CMAs?

The one thing about the CMA, as Mr. Berry has made comment, is that smaller carriers who are targeted in a market that might be able to provide better customer service, better quality service, and quicker delivery of that service than an incumbent that might otherwise warehouse the spectrum, might be a way to—you know, to kind of get at this.

And then, I would be interested to hear Mr. Ford and Ms. Derakhshani's comments on this, in terms of—

Mr. LARENT. Well, I would say, Senator, that—first of all, congratulations on your award. Second of all—

Senator WARNER. Not as cool as yours, and I don't get it until—

Mr. LARENT. Yes.

Senator WARNER—the fall.

[Laughter.]

Mr. LARENT. But, second of all, I think that what you're talking about is—number one, we don't get involved in the size of the licenses, because we have a lot of Mr. Berry's members as our members, we have the big carriers as members. So, we don't get involved in that debate. But, I would tell you that the more spectrum that you bring to the market, the fewer debates, like we're having today, will exist, because everybody's going to get a chance to supplement their spectrum holdings. And that's what's—that's what we have always pushed, is, get as much spectrum as possible to the market as soon as you can, and then a lot of these debates that we have between Steve and myself or our carriers have among one another, those go away, because—

Senator WARNER. And should there be any distinction between that spectrum below 1 gigahertz and that spectrum above?

Mr. LARGENT. Yes. I—and I think—I would draw the line at 3 gigahertz and below. That's the spectrum we're particularly targeting for auction for wireless carriers.

Now, we support the other folks that want to have Wi-Fi and other services. We support that. But, in particular, the spectrum that's below 3 gigahertz, that's what we're really looking at for wireless—

Senator WARNER. I'm going to—my time's run out, I won't ask the others. I'd only make one other comment, to my colleagues.

I know this debate about unlocking phones is important, but if you don't have interoperability, it doesn't matter if you unlock, because if you—that phone can't be used across systems. And one of the things that I hope we can get more growing consensus on is not lose track of the fact that—we would not have a wireless system in America, but for the requirement the FCC made, 35 years ago now, on interoperability.

Mr. Chairman.

Senator PRYOR. Thank you.

Senator Fischer.

**STATEMENT OF HON. DEB FISCHER,
U.S. SENATOR FROM NEBRASKA**

Senator FISCHER. Thank you, Mr. Chairman.

We seem to be having a focus, here, in our conversation on how the Government's going to get the most revenue out of this spectrum auction. And I guess I would open this up to Mr. Webster and Dr. Ford. And I'm interested in your opinion, as well. But, first, I'd like to inject this into the conversation:

Do you think that wireless service is a right of every citizen of this country? If you do, do you believe that smaller companies that service people in areas that have difficulty in receiving service or receiving timely upgrades—should the Government somehow recognize that right, if it exists, and how should it be addressed?

So, I would ask Mr. Webster, first, and then Dr. Ford.

Mr. WEBSTER. Senator, at Cisco, we believe broadband is a great enabler for societies, for education, for business, for productivity of the economy, for telemedicine, for public safety, for, simply, better quality of life and all that can be done that can help foster even greater broadband penetration. Higher quality broadband and faster broadband is something that should very much be pursued.

Mr. FORD. Well, I think if you want to maximize the auction revenue, you need to sell one license. Monopolies will pay the most. So, that's really not what we're trying to do, I don't think. We use that. We're—I mean, I think Senator Warner mentioned "maximize revenues and maximize the number of people that get it." It is this playoff between the two.

As far as the rural markets, I think it's—it's interesting to think about that problem. And I don't know if I have a specific answer for you, but I have been thinking about that as this interoperability issue and roaming issue comes up.

If you take roaming, for example, the argument for roaming is, you need—we have to force these larger carriers, that are every-

where—nationwide networks—to permit—smaller companies don't have nationwide networks—to use their networks, because, if they don't, there's no demand for the service, which is essentially saying there's no demand for local mobile wireless service. It's a national market.

So, to some extent is—if we keep forcing—imposing these rules, we are creating entities that really don't fit into what the market really may be. OK? So, that's an interesting problem.

It's sort of that way with interoperability, as well. If being—having a certain market share or operating in certain places is what drives the equipment market—if you're not in that space or you're not big enough, then are you the right type of firm to serve this market? Can you serve the market efficiently?

And I guess, as someone who was—worked for an unbundled element, CLEC, I'm a little bit worried about business plans that hinge on government promises and rules rather than the underlying fundamental economics of the business. And I think we're getting into that area a little bit. But, I can understand why people would say, "Well, they're not going to get served," or something like that. But, I think that's sort of a secondary market problem. If the larger carriers don't want to serve the rural markets, then why wouldn't they allow someone else to use their spectrum? And I think there are some—we need to study, carefully, what it is about the secondary market that is keeping firms out of it to address many of these problems.

Senator FISCHER. Mr. Berry, do you think some of those ideas that we just heard from Dr. Ford are going to help with access, then, to rural areas? Or do you have other suggestions on how we can improve that access?

Mr. BERRY. Yes, I—I don't agree with much of anything of what Mr. Ford just said. If you're in rural America and you want access to wireless, I think—whether you consider it a right or not, I think there are competitors out there that would like to provide it. And what we've seen is, the smaller carriers are willing to build out that most difficult-to-reach, most costly buildout, and service those few customers, because that's their business model. The larger carriers, it's barely a decimal on their profit sheets. And it would be the last place that they would build out, unless there were buildout requirements.

In Germany, you know, they actually did a reverse buildout. You had to build out the rural areas first. Of course, Germany, there's not a whole lot of rural areas, compared to the United States. But, there are countries in the world that have addressed that. Canada has addressed it in their latest 700 megahertz. Build out to rural areas first, before you get to the metropolitan areas.

I don't know that's what we would do, but there are ways, with government suggestions, that you can ensure that every consumer has access to broadband.

And we did a study, a year or so—a year and half ago, that showed that, in rural America alone, out of the 14 states—19 states—that had less than 90 percent penetration, if you were to build out mobile high-speed broadband, you would actually increase the median income of every family in that state by as much as 5 percent. Now, that's the type of growth in rural America we'd like

to see, and that's the type of job promotion—over 100-and-some—110,000 jobs created, just in rural America—with the mobile broadband buildout. Those are the types of economies of scale that may not show up in a flat economic study about what we should or shouldn't do.

Senator FISCHER. Thank you.

Mr. LARGENT. Senator, could I add just one thing to that?

Senator FISCHER. My time's up. If—

Mr. LARGENT. Well, I was just going to say—today, LTE is the 4G technology that wireless is providing, and today, 90 percent of people in this country are covered by that LTE network. Today. So, we're talking about another 10 percent. And this is technology that's just been around for, you know, less than 18 months. So, we're rapidly covering the country. It's the 10 percent that we're talking about now that I think will be covered in the near term.

Senator FISCHER. Thank you.

Thank you, Mr. Chairman.

Senator PRYOR. Thank you.

So, our next two Senators would be Senator Johnson and Senator Nelson.

Senator Johnson.

**STATEMENT OF HON. RON JOHNSON,
U.S. SENATOR FROM WISCONSIN**

Senator JOHNSON. Thank you, Mr. Chairman.

I love it when people agree on things. And it looks like we're all agreeing on: we need more spectrum. So, kind of going down the line—anybody that wants to chime in, starting with Congressman Largent—what is the greatest roadblock? What's the number one stumbling block to creating more spectrum?

Mr. LARGENT. Well, I'd answer—two things. One is on the auction that's immediately scheduled to occur in 2014. One, we have to keep it on schedule. And that's going to be a challenge, with the vacancies at the FCC today. Second, the additional spectrum that we need, beyond broadcaster spectrum, it—well, even with it—going back to the broadcaster spectrum, it's—there's no way to assure how much spectrum is going to be available, because they may not buy into it.

Now, we're working—our companies are working with the broadcasters, trying to erase as many difficulties as we possibly can to try to free up 120 megahertz of spectrum, if we can. I don't know if that's going to be possible. You know, put that one on hold, and watch and see.

In addition to that, though, we're going to need—if we get to the 500 megahertz of spectrum that was called for in the National Broadband Plan, then we have a lot of work left to do, and the Government is not always willing to part with the spectrum that they have.

Of all the usable spectrum that there is, the Government owns 70 percent of it. So, 30 percent, we have—or, Wi-Fi has, or somebody else has, other than the Government; 70 percent, they have. So, we have to find a mechanism to coerce the Government to give up some of their spectrum. And that's hard to do, because they're sitting on spectrum that, you know, they were given, and there's

no reason that they have to give it up, because they don't get the—

Senator JOHNSON. But, don't—

Mr. LARGENT.—they don't get the auction proceeds—now. We think they should. But, they don't get the auction proceeds, so why voluntarily give up spectrum that you have? So, that's going to be an issue for us, going forward.

Senator JOHNSON. So, the short answer is: government.

Mr. LARGENT. The Government has a lot of spectrum. We need to try to figure out a way to free it up.

Senator JOHNSON. Yes. And government's not that easy to coerce.

[Laughter.]

Senator JOHNSON. Mr. Berry.

Mr. BERRY. I agree with Steve, that there are two areas to look at. You know, you go where the vast majority of it is. And one is, government owns exceedingly amounts—large amount of spectrum. And they do need to be much more efficient, and we do need to find a way that we can move them out, where they're compensated. And, actually, when you think about it, we get—they get new devices, they get new technology. LTE networks are five times more efficient than the 3G networks that are out there now. If government thought that way, they might say, "Well, maybe I could get five times more efficiency out of spectrum—less spectrum."

And the other is the broadcasters. You know, 120 megahertz would be nice. I mean, you've got to ask yourselves—the broadcasters, for all the good they have done, 90 percent of the American people listen to their broadcasts over some other wireline capability, either a dish, a satellite, or cable. And 10 percent—8 percent of the American people listen to it over the air. What is the economic justification for those two imbalances? When \$166 billion is estimated, of new growth in the economy if we added 500 megahertz of spectrum, I think we know where we have to go get it.

Senator JOHNSON. OK.

Mr. BERRY. It's a tough decision.

Senator JOHNSON. Mr. Webster?

Mr. WEBSTER. Senator, in addition to the comments from the previous two witnesses, I think there is a burden—or a hurdle will be a lack of urgency. This is not necessarily a problem that is just going to be coming in the future; it is starting to get to be immediate issue now, and is going to require action to get as much spectrum as quickly as possible out into the marketplace.

The second issue, especially in terms of the voluntary incentive auction, is going to be—the education needs to be driven by the FCC to the broadcasters, themselves, especially in the major metropolitan areas, where they have the biggest—the biggest need for the spectrum. We can't necessarily expect a broadcaster to understand all the nuances of the telecommunication world, and that's a big area that the FCC could strongly contribute in to help make that auction a success.

Senator JOHNSON. OK.

Mr. Nagel.

Mr. NAGEL. I think one of the things is, sort of, the concept of incumbency in some of these spectrum bands. If you look at—look at the 5, you know, gigahertz band, which is probably the most

promising, from the standpoint of making large channels to drive really, really fast Wi-Fi. It's the idea that, sort of, "I own it." And I think that what we—what we need to do is sort of have a new view, which is spectrum sharing. You know, there are people in almost all spectrum now. And so, we have to really develop this concept of, how do we share amongst ourselves, develop the rules so that things like Wi-Fi, which is a secondary service, work with, sort of, licensed and other incumbents?

Senator JOHNSON. Mr. Ford.

Mr. FORD. Entitlement to what you have licensed, which is what everybody said. I've been thinking about the Government issue a lot lately, and I think the problem is, we have a command-and-control management of spectrum in this country, and we need to inject the market, not in fiddling with the incentives of the Government, but inject the market into the management of spectrum, itself. Because these problems—when you can start moving money around, people get interested in talking to you. But, now we've got to deal with the FCC and the NTIA and maybe Congress, and try to get all these things done, and it's just—and mainly so—I mean, I don't know if the broadcasters are taking money from the Government in the spectrum auction, or the Government is taking money from the broadcasters in the spectrum auction, but if you can get the market involved in the management of spectrum, then I think it'll move a lot quicker than it is.

Senator JOHNSON. Ms. Derakhshani, I know I'm over time, but I hate to not give you the opportunity.

Ms. DERAKHSHANI. Very quickly? Great, thank you.

So, we would say, beyond the problem, freeing up spectrum and getting it to market, it also must be built upon quickly. Consumers won't be able to benefit from this additional spectrum unless it's built out upon. And, for that reason, I would say that we disagree with Dr. Ford's analysis that consumers will benefit from spectrum going to the largest carriers. Economic theory, as useful as it may be, doesn't necessarily serve as a proper metric for consumer welfare.

Senator JOHNSON. Thank you.

Well, Mr. Chairman, I think, to—just to summarize, it's going to require urgency from the Federal Government, and I certainly appreciate your holding this hearing, because we've got to create that sense of urgency, that type of leadership.

Thank you.

Senator PRYOR. Thank you.

Senator Nelson.

STATEMENT OF HON. BILL NELSON, U.S. SENATOR FROM FLORIDA

Senator NELSON. Well, what happens if we don't release a lot of spectrum? So, Mr. Largent, what I'd like to ask is, To what degree can you make equipment and systems more effective if that were the scenario to play out?

Mr. LARGENT. Yes. Well, I would rely on the experts on that. And so, I'd look to a company like Qualcomm, which builds efficiency into wireless networks. And their CEO said, at our show, not this year but last year, that we are fast approaching the time where

we've gotten all of the efficiency out of the market that's available, that they don't have any new tricks up their sleeve to develop more efficient systems to take advantage of the spectrum that we have today—that we're going to have to have more spectrum, is the bottom line.

And what are the results if we don't get more spectrum? I can tell you that it—what you will see happen—my guess—I've never been told this, but my guess is, you'll see higher prices, because when—that's how a carrier or a manufacturer deals with inefficiency in the marketplace and a lack of new materials or new spectrum, is by raising the prices. So, that's the only way that you can monitor or control the usage that's on your system that you have today. And that's not—that's not the world that we want to see.

Senator NELSON. The way Congress is operating is not the world that I want to see, either. And yet, we find that it often doesn't work.

Anybody else want to comment on that?

Mr. FORD. Higher prices and lower quality, that's what'll happen. And you'll find innovative new business plans. Comcast building out its Wi-Fi network—people will start using that kind of model, but it won't be, really, what people want; it'll be an imitation of what people want.

Senator NELSON. Mr. Webster?

Mr. WEBSTER. Yes. Just to use my Beltway analogy, Senator, from opening comments, if there's nine times more traffic on the Beltway in 5 years, there's going to be a great loss of productivity, a great loss of quality of life. It would affect the economy and actually make for a thoroughly unpleasant experience for us all.

I think the way to solve this, no question, is going to get more licensed spectrum available, more unlicensed spectrum. There is a requirement, on technology innovation, to continue to improve the efficiencies, as we've seen with the difference between 3G and 4G. And there also is going to be a need to have network management that is appropriate to actually direct the proper supply to the demand when it's actually going to be necessary to optimize the experience for all. It's a combination of all four of those. It's not an either/or but a both/and scenario.

Senator NELSON. So, Cisco can do all of it to make it a lot more efficient.

Mr. WEBSTER. Senator, I wish I could tell you that were the case. But, we definitely can advance on the technology innovation, and we can be ardent advocates to help promote national broadband for the betterment of this country and all others around the world.

Senator PRYOR. Thank you, Senator Nelson.

Mr. Berry, did you have a comment on that last comment?

Mr. BERRY. Oh, I was just going to—thank you—I was just going to say that we are going to have to get better on the technological side. I'd say 90 percent of our capacity has been through technological innovation, not increasing spectrum. And—over the last 20 years—we are getting to that point, that there has to be significant breakthroughs. And whether it's software-defined antennas and radio—frequency skipping radios, we're always looking. But, they're 5 or 10 years away, and we're on an immediate head-on collision.

There's other things that we can do right now to—especially in some areas—to enhance and—the efficiencies of the spectrum that's currently there. I know that, last year, Senator Klobuchar and Senator Snowe introduced the legislation that would actually put some real flexibility in utilizing unused spectrum in those rural and regional markets. And hopefully, we'll start looking at innovative ways to do that. It won't stave off the draconian impact, but it will allow us to survive a few more years.

Thank you.

Senator PRYOR. Mr. Webster, let me ask you a quick question—I see that we're being joined by another colleague, here, but let me ask you a quick question about spectrum.

We've all talked about how we need more spectrum, but is it fair to say that not every area of the country needs more spectrum, that, for a lot of areas of the country, it's just really an infrastructure limitation more than, truly, a spectrum limitation? Although there are clearly some urban areas and congested, kind of, metropolitan areas that definitely need more spectrum. Is that fair to say?

Mr. WEBSTER. In our experience, every major operator in the developed world is in need of spectrum, one way or another. Certain developing nations don't necessarily feel the pinch, but, very much in the United States, there are going to be requirements of both licensed and unlicensed. We are seeing—to your point, Senator—definite need in the very dense metropolitan areas, right now, where there's just a very high concentration of people and devices looking to take advantage of the benefits of that. That's why any and all spectrum that can be made available for use would be helpful.

Senator PRYOR. And let me just follow up on that, if I could. And that is, are there ways that we could offload the need for spectrum with some of our wireless devices? For example—I'll just give you a couple—where a wireless device could pick up, just, over-the-air broadcast television and radio. Does that move the needle much, in terms of the need for spectrum?

Mr. WEBSTER. Sir, in terms of the overall demand of offload, you very much are accurate, in that there is going to be a need to offload from the more tightly constrained licensed radio spectrum, or cellular radio, off to the unlicensed radio spectrum, largely through Wi-Fi. And the key is going to have—to be those two technologies working together as seamlessly as possible to have a very smooth mobile experience. In terms of broadcasting over the air, that is one option to consider; however, the vast majority of demand now is on-demand, where broadcasting to many doesn't necessarily work.

Senator PRYOR. I see.

Senator Rubio.

**STATEMENT OF HON. MARCO RUBIO,
U.S. SENATOR FROM FLORIDA**

Senator RUBIO. Thank you.

My first question—either Dr. Ford or Mr. Largent could help answer this—is about secondary spectrum markets. And considering the growing spectrum demand that we have, and the amount of time it takes to get spectrum from auction or clearing it to the mar-

ketplace, secondary market transactions become that much more important and necessary in order for carriers to acquire spectrum. So, should FCC approval of these transactions be streamlined, particularly for smaller transactions? Do you have any thoughts on how we should do that?

Mr. FORD. Well, I recently wrote a paper on that, at least certain aspects of it. I think, certainly, if you've got a capacity problem, a spectrum problem, and somebody has some that they don't need, and somebody does, you make a transfer. But, always, these transfers get bound up in the politics of the deal, and people see opportunities to, you know, impose voluntary conditions and things of that nature. I think a lot of the smaller deals do go through. It's when you start getting—as we've been talking about here today, when you start getting AT&T and Verizon involved, then you run into problems, where people are saying there's too much spectrum concentration.

But—the FCC has been a little slow, but they've actually approved deals recently without too many conditions on them, so there's some help there. But, there are many—that secondary market issue needs to be figured out and resolved, and I'm—I don't know all the problems with it, but it's not working as well as it should.

Mr. BERRY. You raised the issue of the secondary market. The secondary market is not actually working for the smaller carriers right now, because they're always being outbid by the largest carriers, because spectrum is at a premium need. And if you look, in the last 2 years, there were a little less than 1,200 license transfers, 800 license transfers went to AT&T and Verizon. In the last year, 300 license transfers went to AT&T and Verizon with under 1 gig in the spectrum. What we haven't talked about here today is the efficiency of the spectrum itself, and how much more efficient certain sizes—certain spectrum and propagation values are over a higher gigahertz spectrum.

So, that the secondary market hasn't worked, I'd like to see ways to enhance it. And I think Senator Klobuchar's bill, last year, would help open up some of those secondary markets for the smaller carriers. It's something I think we should still be exploring.

Senator RUBIO. My second question—and again, anyone can help answer this; I think I know the answer, but I want to make sure—is that I know the industry is really focused on the 25 megahertz from 1755 to 1780, but do we have a cost estimate for clearing Federal users from that 25 megahertz? And if we don't, I guess the question is, why not? And doesn't that really hurt the chances of clearing it?

Mr. LARGENT. The industry's actually done a study on that, and they've used government figures to come up with this result. But, the result was, it was going to cost about \$4.6 billion to move the Federal users.

Mr. BERRY. I should note that—Steve is exactly correct, but if you pair that with the 2155 to 2180, the entire value of those two pairings—and you have to sell 2155 to 2180 by 2015, according to the direction of Congress—the value of those two paired spectrum would be \$12 billion. So, there's an opportunity, here, for us to act, and act now, and I totally agree with Steve on that.

Senator RUBIO. OK. And my last question is based off the testimony of Mr. Webster. You stated—this is a quote—that “Mobility has the potential to generate hundreds of thousands of more jobs if the Federal Government acts promptly to ensure that additional spectrum is made available to fuel future mobile broadband growth,” end quote.

My question is, what happens if we don’t? What happens if we don’t act promptly in that regard? What are the implications for our economy? Maybe the FCC and the NTIA don’t work together to make more spectrum available.

Mr. WEBSTER. Senator, I believe the implications are that we’re going to stall a very growing, thriving sector of our economy. We’re going to be minimizing productivity gains of all different users, and impeding communications in our economy. And, frankly, it will start to put us behind on the global landscape. If we can’t have strong mobile broadband, there are going to be a number of sectors that will—very well may choose to reside elsewhere. They will go someplace where they can actually get the bandwidth they need to operate their global businesses.

Senator RUBIO. Thank you.

Senator PRYOR. Thank you.

Senator Blumenthal.

**STATEMENT OF HON. RICHARD BLUMENTHAL,
U.S. SENATOR FROM CONNECTICUT**

Senator BLUMENTHAL. Thank you, Mr. Chairman.

Thank you all for being here today. And I have a couple of questions. I hope I won’t cover ground that has been covered already, from what I’ve followed.

Let me sort of pick up on a point that Mr. Berry was making about the differences in spectrum—not all spectrum is created equal, so to speak. And the Department of Justice recently wrote to the FCC, as you know, to ask that the FCC weigh in on exactly this issue, on how the Commission can structure its spectrum policy to encourage competition and promote consumer benefits. And the DOJ noted that, just like in real estate, some spectrum is the equivalent of beachfront policy; and others, less desirable.

So, since the beachfront property, so to speak, is already heavily concentrated—I think 78 percent of the spectrum below 1 gigahertz belongs to—or, is controlled by AT&T and Verizon. Let me ask both Mr. Berry and Mr. Largent, what can be done to put more sensible limits on spectrum consolidation before reviewing mergers? Do you think that there ought to be limits, in reviewing mergers or conducting auctions? On approving other spectrum license transfers, should the FCC account for the differences in the quality of spectrum, particularly in low- and high-frequency spectrum, in making those kinds of judgments?

Mr. LARGENT. Well—yes, I—Senator, the ideal situation for a carrier is to have both high-band and low-band spectrum. One is better for when you’re dealing with concentrated users, and the other—and another type of spectrum is better to cover broad areas in rural communities. So, ideally, carriers want to have spectrum both below 1 gigahertz and above 1 gigahertz. So, that’s ideally.

But, I would say we have carriers on both sides of this, and so it's kind of—it's an issue that we don't deal with at CTIA, because there's not a unified position within the industry about the direction that we should go.

Senator BLUMENTHAL. Mr. Berry?

Mr. BERRY. Senator, I'd—I have a chart here that you might want to look at, if you can get a clerk to provide you. It's actually a coverage comparison on the value of spectrum. And the—and courtesy goes to Verizon for putting this together. I think they did this for one of their stockholder meetings.

But, it shows that there is a significant difference in the value of low-band spectrum and high-band spectrum. Matter of fact, the build is four to five times as many towers to cover the same amount of spectrum if you have high-band versus low-band.

And this 600 megahertz spectrum that's coming available is absolutely prime real estate. And that's why I think that the FCC should do two things. One, they should finish the spectrum aggregation proceeding that they currently have, and identify what is a spectrum amount that is acceptable in every market. And then they should put a trigger—a double trigger in there that says, "If you're in a market where you're exceeding or about to exceed the spectrum trigger, then you ought to be able to justify whether or not you need the spectrum, or not." I think that those two things put in place for the auction would probably end up limiting certain markets that AT&T and Verizon could accumulate over a certain amount of spectrum—and that would go a long way to making sure that smaller- and intermediate-sized regional carriers could actually buy the spectrum that they need to continue to be competitive.

Senator BLUMENTHAL. So, you think there should be some kind of sensible limits or controls or—

Mr. BERRY. I think it'll bring certainty to the market, and I—hopefully it will keep AT&T and Verizon bidding in the market, and hopefully we'll have an ecosystem that everybody can participate in. So, yes, I do believe there should be some type of gating mechanism so that one carrier cannot walk away with the pie.

Senator BLUMENTHAL. Let me shift to text messaging. Maybe you can explain, Mr. Largent, why there is a discrepancy between the low cost of transmitting text messages for the mobile carrier and text-messaging rates, which seem to be increasing.

Mr. LARGENT. Well, I can tell you that I, personally—my rates aren't increasing. And it's not because I'm the head of CTIA. My wife's rates aren't increasing, either, because we have an all-you-can-eat plan. And the majority of Americans have a plan similar to that, where they pay one fee. I think it's—

Senator BLUMENTHAL. Well, my understanding is that, actually, most consumers, or many of them, are paying more for text messaging. Over the past several years, carriers have been offering fewer options in text-messaging plans, and at higher rates. Most carriers now compel consumers to choose between a \$20-a-month unlimited text-messaging plan or a per-message rate of 20 cents. So, the options are fewer. You may have chosen one where the cost, incrementally, does not rise. But, for other consumers, text-messaging costs are increasing. And the point is that the costs for the carrier are not increasing.

Mr. LARGENT. Well, what I would say is, the great thing about this innovative industry, there are always ways that you can get around that, as well. There's many applications you can download on your phone, where there's no cost to text message. So, I just think, in this really creative, competitive, innovative industry, there are ways to work around these different issues that consumers have. And, frankly, that's why this industry, to me, is so exciting and fun to be a part of.

Senator BLUMENTHAL. Well, you should talk to some parents. You've talked to your wife. You should talk to parents—I don't know whether you have children—who have to pay their children's cell phone bill. And that per-message rate, if that's the one that they choose, can add up pretty quickly. And the point, here, is that maybe there should be lower-cost options for that per-message rate.

Mr. LARGENT. Right. And that's what I'm saying. There are lower-cost options that are available. So, it's just a matter of the consumer finding those out. And it's not like they're hidden. If they look for them, they'll find them.

Senator BLUMENTHAL. My time is expired, but I do appreciate your being here. Thank you very much.

Senator PRYOR. Thank you.

Senator Klobuchar. Thank you for your—

Senator KLOBUCHAR. Thank you. I just want to follow up—no questions, but I'm one of those mothers that didn't want to get the unlimited texting, because I didn't want my daughter to unlimited text. And I know what those higher bills are like. So, thank you. And I still haven't changed. And I hope that you'll change.

The questions I had was on spectrum. And we've talked a lot today about how there's just this growing demand for spectrum. We all know that. And with this increased discussion about relocating government spectrum users in order to increase spectrum available for commercial—for consumer broadband usage, I know that Commissioner Rosenworcel has suggested providing financial incentives to government agencies to participate in relocation. And, as I understand it, she has proposed allowing agencies to reclaim a portion of the revenue that would come from auctioning off their spectrum, and this would be used to relieve the significant budget pressures facing all Federal agencies.

Could you explain, Congressman, if you envision such a proposal could work?

Mr. LARGENT. I think it absolutely can work, and I support that. And I've relayed those comments to the Commissioner about that. I think it's a great idea.

Senator KLOBUCHAR. OK.

Anyone else want to comment?

Mr. BERRY. Yes. Actually, we did that in 2001/2002, when we cleared 1710 to 1745. I was at CTIA at the time, and we passed legislation that authorized the DOD to actually get reimbursed for the cost of their new capabilities, moving to a different slice of spectrum. And I agree with Steve—Mr. Largent—that it will be helpful, and we ought to try it, because we need to get more spectrum out of the Federal Government, for sure.

Senator KLOBUCHAR. OK.

Anyone else?

[No response.]

Senator KLOBUCHAR. OK. I am the Chair of the NextGen 911 Caucus, and we're always looking for ways to improve public safety. Clearly, interoperability in the whole spectrum issue will be helpful. And we've got, in our state, about 27 percent of the Minnesotans living in rural areas, but almost 70 percent of our motor vehicle accidents occur in rural areas. And we know there are a number of reasons for this disturbing fact. But, could you speak a little bit about the public safety implications of widespread access to wireless networks, especially in terms of decreasing response time? And could you discuss, maybe—either of you, at the end there—how your members are working with the FCC on the implementation of text-to-911 services, which—we know a lot of people are now using text to communicate with 911.

Mr. LARENT. Sure. We're actively working with the FCC to participate in the 911 panel that they have, the Committee. And, you know, my hope is, is that we can expedite this process. We have done a lot of work. And, frankly, though, a lot of work still needs to be done, on the Government side of the equation, to get them caught up, in terms of the equipment that they have and the ability to receive information from wireless carriers, that they can't now. So, that really is one of the most inhibiting factors in delivering next-generation 911 service, is their ability to receive the information at those centers that you're referring to.

Senator KLOBUCHAR. Do you want to add anything, Mr. Berry?

Mr. BERRY. Yes. We, too, are working with FCC. And actually, have—are complying with the text—the bounce-back for the text 911 bounce-back. And the smaller carriers, may take them a little longer. And I think we're working with FCC to actually be able to meet the NG-911 requirements. But, it's—absolutely right, with that capability comes a responsibility. And our carriers, I think, are stepping up to the plate.

But, Steve is absolutely right, it would be nice to have PSAPs, and the public service—or public answering systems—compliant, also.

Senator KLOBUCHAR. Very good.

You raised, Ms. Derakhshani, about the issue of cramming, earlier in your testimony. And I know there are intricacies to the wireless industry. But, at the same time, I've seen consumers show me their bills in Minnesota, not just on the—on regular phones, but also on the wireless. And I know the FCC's looking into this. And how underreported do you think it is? I just know—we had a Lutheran minister who went through his bill every single day, and then found it. And I just don't think everyone's doing that and looking at their bills that carefully.

Ms. DERAKHSHANI. Absolutely. We think this is a very important issue. We've been alerting our readers to the practice of cramming, and telling them to carefully look at their bills every single month. But the fact is that when consumers do not anticipate these charges—when consumers do not initiate the requests to have these charges, they're not looking for them. This further contributes to the problem.

Industry often points to the fact that these numbers—the complaint numbers simply aren't there. But, the fact of the matter is,

these numbers are underreported because many consumers have no idea that this practice is taking place.

Senator KLOBUCHAR. OK.

I'll put my last question on the record—I see Senator Ayotte's here—but, to you, Mr. Berry, and it's just about the interoperability issue.

I thought it was good, Senator Warner raised that. It is true that we need the interoperability to do the unlocking. And my question was going to be focused on the rollout of 4G service and the problems with that, in rural areas, if we don't have interoperability. So—

Mr. BERRY. Well, especially in the lower 700 megahertz band. Without interoperability, it's going to be a long time before our carriers can get devices.

Senator KLOBUCHAR. Exactly.

Thank you very much.

Senator PRYOR. Thank you.

Senator Ayotte.

**STATEMENT OF HON. KELLY AYOTTE,
U.S. SENATOR FROM NEW HAMPSHIRE**

Senator AYOTTE. Thank you, Mr. Chairman.

I appreciate the witnesses being here today.

Mr. Ford, I've got constituents in more rural areas of New Hampshire—Coos, Carroll County, and to some extent, Grafton County—that really don't yet have full access to the wireless or broadband capacity that they need. Roughly a third of American households don't even have a landline.

And then, for economic activity and growth, what can we do to increase access and deployment in these areas? How does a competitive marketplace increase access in more rural settings?

I'm also going to have a follow-up to Mr. Berry. Understanding you represent the smaller carriers, I'd like to hear your thoughts. I'm not a big fan of the Universal Service Fund, the way it is structured now, because New Hampshire is a \$25 million annual net donor. We have these needs that I'm talking about that are real needs in rural areas of my state.

I'd ask Mr. Ford, first, just from the competitive side, what are your thoughts on rural development?

Mr. Berry, count me as someone who doesn't want New Hampshire to continue to be a net dolor to this fund. As someone who represents the smaller carriers, how do you suggest we address the disparity and equity issue of states like mine receiving 37 cents for every dollar we contribute to the Universal Service Fund?

Starting with Mr. Ford.

Mr. FORD. Well, whether the market is competitive or not, there are going to be areas of the country where it just doesn't pay for a private company to provide service. And, in those cases, if the Government can make it happen, they've got to come in with some kind of universal service program. But, like you have noted, those programs aren't all that good. And that's the—a fundamental problem with government trying to do nearly anything, and the problem with just being—living in a place where it's not economic to serve. In some cases, there's an economic case that comes from a

carrier, who wants to be nationwide and wants to sell coverage, who might cover an area that's not really profitable, in and of itself, except for the fact that people may vacation there or drive through or something like that. But, there are just a lot of areas where there's no business case. If the Government wants to come in and try to create a business case in some way, that's possible.

Competition is a problem, in some respects, because, in the old days, we did, sort of, internally funded universal service, where a carrier served the whole area, and he would take profits from an urban area and shift them over there, and that was fine. When competition developed, the margins were stolen by the competition, and you couldn't support that internal subsidy.

There are probably some very creative ways to do it. I think that Universal Service may keep people from really searching out those competitive ways to solve that problem. You know, the Government could do some simpler things—build backhaul towers that could be shared, those sorts of things. I just don't think there's much discussion of that—I'm not certain of that—partly because there is this system that's supposed to take care of it, and people kind of think that's going to do it.

Senator AYOTTE. Right.

Mr. FORD. And it doesn't. And if I wanted to, maybe—if I could get a little bit of money—I talked to a guy who had arranged to build a wireless network on some water towers in a little community in north Alabama, and he couldn't get any help to do it. It wasn't very expensive—\$60,000 or something is all he needed. Couldn't get it from the NTIA on the broadband thing. You know, I think it's just really a failure of an institution. And maybe that institution will always fail. Maybe government just can't do it, and we just have to live with it.

Senator AYOTTE. Mr. Berry?

Mr. BERRY. Thank you, Senator.

Universal Service Fund and CAF, the Connect America Fund. You should be outraged that there—

Senator AYOTTE. I'm outraged for my constituents—

Mr. BERRY. Well, you should be.

Senator AYOTTE. You don't have to tell me.

Mr. BERRY. Well, you share the same position as most of the wireless carriers. We contribute 44 percent to the Universal Service Fund, and wireless carriers take less than 20 percent of the Universal Fund dollars. The so-called "reform" on USF was disastrous to wireless—rural wireless carriers. It totally decimated the revenue. Sixty percent increase to ILECs, 6 percent increase to RLECs—rural electric; 60 percent reduction to wireless carriers. It's an outrage to say that we did anything to improve broadband—high-speed mobile broadband in rural America. And your state was one of the ones that got really severely hit.

I'd like to see a program at the FCC that is technology neutral and gives everyone an opportunity to bid. What they're doing with CAF-1 and CAF-2 and the Mobility Fund, I think it was outrageous. And the wireless carriers continue to support USF contributions—like I say, to 44 percent of the total fund—and take almost nothing.

There's a few things—I'd love to talk to you, offline, on some of the things that we're working on at the FCC to make them—or at least get them to look at their next phase of CAF-1 and CAF-2. You're talking about a CAF-1—Connect America 1—for wireline companies that was \$300 million, and \$185 million of it was not accepted by the wireline companies, because they did not want to commit to carrier-of-last-resort responsibilities. We had wireless carriers more than willing to do that. So, I'm sitting there saying, "What's the policy that we should pursue?" We should recognize that, in some areas of the United States, wireless will be the most efficient and most effective deployment of high-speed mobile broadband. And the Federal Government ought to recognize that, it is a substitute technology.

So, I'd love to talk to you about some of the things that we're working on, and hopefully, you know, we could make some positive inroads down there.

Thank you.

Senator AYOTTE. I would appreciate that.

And I know that my time is up. I've got a couple of more questions that I will submit for the record.

But, I appreciate you all being here, and I'm glad to hear that you're as outraged as I am for New Hampshire.

So, thank you.

Senator PRYOR. Senator Ayotte, thank you for being here.

And I do have one follow-up question for Ms. Derakhshani, and it's about cramming. Years ago, when I was Attorney General, we dealt a lot with this, just on your home telephone and cramming on bills. I remember, with telephone service, it was hard, because your typical telephone bill is not the same every month, you know, depending on if you're using long distance or whatever's going on. So, sometimes the customer doesn't really know, kind of, what their average is; and if it's a little high one month, they don't even look at it. And I assume that's pretty true with a lot of wireless plans, as well. I mean, you can get the packages and get all the data and all that. But, you know, a lot of this just depends on month-to-month.

So, the question is, do you think that the wireless companies should do something proactive? Like, for example, maybe send a text to their customers when something is placed on the bill so the customer can be notified and see it and verify it.

Ms. DERAKHSHANI. Absolutely. We were really glad that this was the case in the bill-shock proceeding. We hope that this is an effective way to alert consumers, to help ensure that they don't go over their plan limits.

We were really glad to see that the landline rules were put into effect last year at the FCC. These rules more clearly separated out third-party charges. We would love to see this for the wireless context, as well.

But, I really do think that carriers need to play an active role in ensuring that consumers are provided with the tools and the information that they need—not only to make meaningful choices, but to also protect themselves against abusive practices.

Senator PRYOR. Thank you.

Well, I want to, again, thank the panel. We've kept you for 2 full hours. I don't think that was our intention. But, I think we had 12 Senators come and ask good questions, and a couple, three, asked two rounds' worth. So, I want to say thank you very, very much for your participation today, and your preparation.

This is going to conclude the hearing, but what I want to say before I drop the gavel is that we will keep the record open for 2 weeks, and members can submit questions. And some of them said that they would submit questions. So, we'd appreciate you all getting back with us as quickly as you can, once those questions come in.

Again, thank you all for your participation. You're outstanding and really helped the Subcommittee understand the lay of the land when it comes to wireless.

We're adjourned.

[Whereupon, at 4:31 p.m., the hearing was adjourned.]

A P P E N D I X

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. AMY KLOBUCHAR TO STEVEN K. BERRY

Question. Consumers who have made investments in their devices, which are not always cheap, should be able to take their purchases with them to any network, unlocking is one way to ensure this . . . interoperability is another. Consumers don't always realize that they are being cornered into one service by a device. How does lack of interoperability impact the rollout of 4G service to rural America and the quality and cost of services they receive?

Answer. The lack of interoperability in the Lower 700 MHz spectrum band has a significant negative impact on a carrier's ability to provide 4G LTE mobile broadband service to rural America. Absent interoperability, competitive carriers, including those who provide service in rural America, who have invested nearly \$2 billion in spectrum in the Lower 700 MHz band, are largely unable to secure the devices necessary to deploy and provide mobile broadband services. The Lower 700 MHz band, known for its superior propagation characteristics, is particularly important for rural areas. Using this spectrum, competitive carriers can service rural areas more economically and with fewer towers than they would with higher frequency bands. The lack of interoperability is significantly impeding the rollout of 4G service to rural America.

As you noted during the hearing, interoperability is required for a consumer to take an unlocked phone and use it on another network. Similarly, interoperability is required to allow a consumer to access service through carrier roaming relationships with other networks while outside their home network area.

The Federal Communications Commission (FCC) has an open proceeding pending on this issue, and I strongly encourage the Committee to urge the FCC to immediately restore interoperability to the Lower 700 MHz band. Restoring interoperability to the Lower 700 MHz band would allow competitive, rural, and regional carriers to utilize low band spectrum that they have already purchased to deploy mobile broadband services in the rural areas that they have historically served. In turn, millions of rural, regional, and lower-income Americans will gain access to 4G LTE mobile broadband services, and will see increased competition and innovative pricing and plans in their local markets.

